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Editorials

THE 1932 ANNUAL MEETING

Arrangements are now under way for the 1932 Annual Meeting to be held at Springfield on May 17, 18 and 19, 1932. For the first time since the Chicago meeting, all Sections will meet in the same building, and the Commercial and Scientific Exhibits will be under the same roof. The new Knights of Columbus Club Building will be turned over to the Illinois State Medical Society, including the club rooms, large swimming pool, and dining rooms. The Society is assured that the Knights of Columbus will do everything possible to make the stay of the members of the Society and the Guests as pleasant as possible.

The Abraham Lincoln Hotel, Springfield's newest and finest hotel, will be the general headquarters for the meeting, and the President's dinner will be given in that hostelry. The facilities are adequate at the Abraham Lincoln for a large attendance at this most interesting function. The Sangamon County Medical Society is already organized and, with Dr. Don Deal as Chairman of the Committee on Arrangements, the Society will again prove the most sanguine that they are to be the perfect hosts.

All hotel reservations should be made through the Hotel Committee of the Committee on Arrangements. Full particulars will be announced at an early date through the JOURNAL. Every member of the Illinois State Medical Society should keep the date of the meeting in mind and arrange to have a banner attendance at the State Capitol in 1932.

A. M. A. BUREAU OF ECONOMICS

The American Medical Association has recently, by action of the House of Delegates, created a Bureau on Medical Economics, with Dr. R. G. Leland as the Director of the Bureau. Dr. Leland is sending an interesting series of questionnaires to all County Medical Societies in the United States to get reliable information

for the Bureau which will be of inestimable value to all physicians. These schedules on Medical Economics should be looked over carefully, and the information given should be accurate, and the component Society Secretary should give them his immediate attention. The information should be thorough and reliable, as the data to be received by the schedule will be used to the best advantage of the medical profession of America.

We are informed that the first questionnaires sent out last year were answered by less than one-half of the Societies, and it is hoped that Illinois will be the first 100% State in the reports returned to the Bureau on Medical Economics. The schedules should not be laid aside, nor should they be filled out by the Secretary without careful study and conference with other members of the local Society. It would be an excellent plan to discuss them at a meeting, to get the views of as many members as possible. The Illinois State Medical Society has been intensely interested in the subject of Medical Economics for several years, and at the Annual Meeting held in Chicago in 1928 had an interesting symposium on the subject, which brought out some interesting discussions. The reply given to these questionnaires should be as early as may be consistent with thoroughness and accuracy.

CONVALESCENT SERUM FOR POLIOMYELITIS

Dr. Andy Hall, Director of the State Department of Public Health, has recently announced that a supply of convalescent serum for the treatment of poliomyelitis is available through his department and can be procured on application at any time. It is of the utmost importance that the serum be given in the pre-paralysis stage in order that the greatest benefit is received.

Owing to the fact that the Capitol Building is not open on Sundays and Holidays, Dr. Hall has arranged with Engine House Number One of the Springfield Fire Department to keep a supply of convalescent serum in a refrigerator, where it can be procured at any time.

On night calls, where it is requested that serum be mailed to a physician, call Mrs. Nell Hall, telephone Capitol 4427. She will have a supply of serum on hand all ready to mail out and stamped with special delivery stamps, so that it can be mailed out immediately after the call is received.

Some very interesting reports have been received from cases which have received the convalescent serum in the pre-paralysis stage, and Dr. Hall is very anxious that the physicians of Illinois understand this arrangement, so that there will be no delay in procuring and administering this valuable serum in cases of Infantile Paralysis.

Harold M. Camp, M. D.,
Secretary.

UNITED STATES IS NOT FIFTEENTH OR SEVENTEENTH IN MATERNAL DEATH RATE

Sir Arthur Newsholme the Great English Authority States That Different Methods of Computing Maternity Mortality Are Employed in Different Countries

The old shyster trick of "one measure for my grain and another for yours" is one of the best of weapons at the hands of those misinformed critics who attack the international comparative standing of the maternal mortality statistics of the United States. And that to the confounding of our country.

Those obsessed with the idea that in state medicine lies a panacea for all national ailments —physical, financial and psychical, material, commercial and artistic—point out continuously and in crescendo that the United States ranks only seventeenth best in the list of countries with reduced maternity mortality.

Those countries laboring under the burdens of health insurance and state medicine are cited fallaciously as illustrations of what such gag rule of medicine does towards increasing reduction of infant and maternal mortality. And yards and yards of garbled statistics are fetched forth by way of proof.

There is only one thing the matter with these statistics. There is only one little item that makes them basically fallacious. That is the item which makes this socialistic comparison even more odious than the general run of comparisons. And that item is that one set of standards is used to measure and to compute maternity mortality abroad, and another and an entirely different set of standards is employed in this country. As a matter of fact statistical computation is not precisely uniform in the various states, and

even the Federal government itself puts a few extra twists into state statistics when those reach Washington.

Russia, Italy and England are among the countries said to have a lower maternity mortality than the United States. Since 1915 statistics, figures and statements of any sort coming from Russia have need to be regarded with only half an eye and with far more than the traditional grain of salt. Italy has never made public the exact method of procedure for the collection of any of her statistics. Great Britain is probably the most understandable and above board, but even in the sister English-speaking domain there is a definite difference in classification as to what on the death certificate means a demise in childbirth because of a parturition accident or result; or a demise in childbirth from some previous ailment or condition that is aggravated by the mechanics of parturition.

The same old tale you see of gross weight, net weight, or excess baggage if the matter is viewed with a commercial eye.

In other words a pound of package oatmeal may be a pound of oatmeal in a package or it may be a pound package of oatmeal.

That the simile is homely makes it none the less accurate. The United States does not follow the same tabulation method of its statistics as does any other nation, nor is there indeed any one set uniform system. If such a system were ever evolved without doubt the United States would lead the list in rate of low maternity death rate, as it does in other beneficent statistics.

This apparently bold statement is made from the genesis of living standards in this country.

The poorest immigrant can find for herself and her family far better prenatal care, from the point of sanitation on, than is found in the continent. If nothing else is cited let the difference in nutritional values be taken into account. Peasant black bread and wine or beer possess a life sustaining content, but can it for a second compare with the balanced food ration known in the home of even recent dwellers in America?

Before comparative statistics can be statistical and comparative there must be some greatest common denominator of census taking whereby statistics submitted for comparison have all been secured, arranged and classified and computed by the same yardstick or rule of thumb.

Since at present there exists complete lack of uniformity in the method of gathering maternal mortality statistics or any other statistics, death rates in different countries cannot be compared with the slightest degree of accuracy. It is like measuring milk by the quart in one hand and by a yardstick with the other.

In Russia the state sanctioned practice of abortion, a factor absent from the death rates of any nation. Between the United States and England, all countries in fact, the methods of census taking differ radically. The United States Census Bureau uses the blanket term of "puerperal state."

This means a death during pregnancy, confinement or period of nursing, or a death occurring within three months of the cessation of any of these functions. In Great Britain, so keenly are the differential distinctions and classifications drawn, that there can be no possible comparison with statistics as set up by the United States. The A. M. A., recognizing this, made a chart (posted at the Atlantic City, N. J., convention of that body some years ago), and captioned "International Incomparability of Mortality Statistics." The Massachusetts Medical Society in 1921 issued a statement deploring the receptiveness with which medical writers almost universally express and maintain an inferiority complex toward the obstetrical situation in the United States by a sheeplike acceptance of foreign statistics, culled under conditions far removed and actually incomparable with conditions for census taking in the United States.

This unscientific, aye, unmathematical, attitude towards these comparative statistics has been commented on officially by the United States government in that section of the Bureau of Census where it is reported:

"As already pointed out, the classification of deaths from puerperal causes differs greatly in different countries. Higher rates in one country than in another, therefore, do not necessarily mean higher mortality from these causes. However, as classification in a given country presumably differs but little from year to year, the rates do presumably serve as useful measures of mortality from these causes with the country itself." And again:

"If every State had had good birth and death registration since 1900 a satisfactory answer to this question would be possible, based on death rates from puerperal causes per 1,000 births, but

as the birth registration area was not established until 1915, and then included but 10 states and the District of Columbia, it is possible to show only a few such rates for a few years, and it must be borne in mind that even then rates were too high whenever birth registration was incomplete.

"To the query 'How do the death rates from puerperal causes per 1,000 live births in the birth registration area of the United States compare with the rates in foreign countries?' the answer must be that here again is a question of the greatest interest and importance which cannot be answered satisfactorily both because of lack of data in this country and because there is no certainty that all deaths from these causes are classified in the same way in the various countries."

Now these contentions from American physicians are receiving confirmatory support from distinguished medical and scientific statisticians elsewhere. For example, Sir Arthur Newsholme, former chief medical officer of the Local Government Board of England and Wales and a distinguished worker in the field of public health, conducted a comprehensive investigation under the auspices of the Milbank Memorial Fund in several countries of Europe, the results of which are included in the first volume of "International Studies on the Relation Between the Private and Official Practice of Medicine." The studies undertaken deal with medical care of the poor, sickness insurance, hospital organization, midwifery service, the statistics of maternal mortality, the treatment of tuberculosis and of venereal diseases and other conditions.

Concerning the statistics of maternal mortality Sir Arthur states that different methods of computing maternity mortality are employed in different countries and expresses the belief that international comparisons are undependable. In practically all other countries he notes a complicating cause of death occurring in the parturient woman is given preference in the death certificate while in the United States childbirth would be given as the cause of death and the complication a contributing cause. In pointing out the discrepancy in comparing statistics of the United States with those of other countries Sir Arthur says "Had England followed this practice (that used in the United States) the deaths officially ascribed to parturition would have been increased by ninety-six influenza deaths in 1925, while in 1918 the puerperal deaths would have been increased by 1,638."

Life for life, day by day, the general death rate in the United States is distinctly lower than that in practically all of the European countries except the Netherlands where people apparently rarely die from any cause whatever. (The published death rate is frequently under 10 per 1,000 population per year.) In 1929, for example, the deaths per 1,000 population reported by half a dozen European countries and by the United States were as follows: England and Wales, 14.5; Netherlands, 10.7; Switzerland, 12.5; Poland, 17.00; Hungary, 17.5; France, 16.5; Germany, 12.6; United States, 11.9. Netherlands is the only country in this group which experienced a rate anything like as favorable as that which prevailed in the United States. Why then lay all the dead of America at the door of the delivery room.

In the second place, the practice of specifying the cause of mortality and of classifying death certificates according to cause varies significantly not only in different nations but in different political units within each country. An illustration of this fact is the percentage of deaths attributed to "unknown" causes and to "old age" in the different countries. Out of a dozen leading nations only four reported in 1927 anything like as low a ratio of deaths from "unknown causes" as did the United States. These 12 countries with the death rate per 100,000 reported as of "unknown" causes and from "old age" in 1927 were as shown in the table:

DEATHS PER 100,000, 1927

Cause specified as:	"Unknown"	"Old Age"
Belgium	57	144
Denmark	23	151
Finland	72	74
France	171	219
Germany	4	129
Hungary	180	256
Netherlands	17	52
Norway	58	147
Sweden	26	177
Switzerland	13	44
England and Wales	3	58
United States	17	11
Illinois	3	5

"Unknown" of course is a debatable and slipshod term and a generic alibi. Yet in the 1910 death registration area of the United States, and embracing practically two-thirds of the population, the death rate per 100,000 ascribed to "Unknown Causes" in the United States in 1917 was only three. American physicians are conscien-

tious in seeking to establish causes of death and honest enough to inscribe these causes in the records and that rate of "three unknown" is lowest of all other countries save one!

Birth registration in the United States is far more lax than in Europe—admittedly at least ten per cent. off. The statistical trend in this country however is to treat maternal mortality now as once was done with old age or "senility deaths."

More recently the medical profession in this country discovered that old age in itself carries off very few people so a more probable cause is sought and usually found. A diseased condition may often prove fatal in an aged person which would be but a trifling illness in the young. Conversely the aged might reasonably be expected to live longer except for the results of such an attack. Thus it seems more logical to ascribe such fatalities to a specific disease although the condition of senility is a factor. It would be just as logical to ascribe to infancy a death of a baby from pneumonia.

An international list of causes of mortality all the leading nations of the world have adopted. Of this the purpose was and is to bring about uniformity of classifying deaths as to cause. Nature is ever prolific in vagaries. Numerous factors which tend toward a fatal outcome are frequently involved. Thus a pregnant woman might conceivably require an operation for appendicitis and then succumb to a post-operative pneumonia. All these factors should be recorded on the death certificate which then presents nice questions for the statistician to decide. To make uniform the classification of such deaths each nation has drawn up a set of rules, which express its interpretation of the international list, for classifying these deaths due to joint or multiple causes.

In the United States practically all deaths associated in any direct way with childbirth or the puerperal state are charged against those conditions. This is in keeping with the rule of the United States Bureau of the Census, which instructs the statistician who classifies death certificates to:

"Prefer puerperal causes except when a serious disease (*e. g.,* cancer, chronic Brights' disease) was the independent cause."

Application of this rule brings into the classification of maternal mortality, due to puerperal causes, many deaths which in other countries are ascribed to other causes.

Rule 3 of the French instructions to statisticians, for example, says:

"If one of the diseases is *epidemic* and the other is not, choose the epidemic disease."

Likewise Rule 3 of the German code reads:

"With an infectious disease and a non-infectious disease, the former should be chosen."

A rule in the English code of instructions explains that

"Any general disease (except pyrexia, premature birth, congenital defects, want of breast milk, teething and chronic rheumatism) to be taken in preference to any local disease except aneurysm and strangulated hernia."

Manifestly the use of these rules make for a considerable difference in the practice of classifying deaths. This would account for an apparently excessive death rate in any one country from any given cause. The United States takes the position that the "puerperal state" is the underlying or primary cause of death in the majority of cases where it is involved.

The official bulletin of the State Department of Public Health at Springfield, Illinois, publishes this encouraging table for at least one state:

BIG DROP IN MATERNAL MORTALITY

Loss of life due to the complication of childbirth was distinctly lower in Illinois last year than in 1929. In actual number the fatalities fell from 818 in 1929 to 693 in 1930, a decline of 125. The maternal death rate per 1,000 births dropped from 6.3 in 1929 to 5.4 in 1930. Improvement down-State and in Chicago was almost the same in volume.

MATERNAL DEATHS PER 1,000 BIRTHS

	1930		1929	
	Deaths	Rate	Deaths	Rate
Illinois	693	5.4	818	6.3
Chicago	298	5.1	359	6.1
Down-State	395	5.6	459	6.5

The maternal death rate for 1930 is one of the lowest on record in Illinois. Prior to 1922 the rate was rarely below 6 per 1,000 births and it was usually above 7. In 1922 the rate was 5.8 and it has been below 6 each succeeding year except for 1926 and 1929 when the rate was 6.0 and 6.3, respectively. The rate was 5.1 in 1927 and also in 1928. Those two years marked the lowest rate on record.

Calculated upon the basis of 100,000 female

population of same age, the highest maternal death rate, 49 per 100,000, prevailed in 1930 in Illinois among women in the 25 to 34 age group. The next highest rate, 40, prevailed among the 20 to 24 age group. In the 35 to 44 age group the rate was 30 and in the 15 to 19 age group it was 20. It is probable that the complexion of these rates would change significantly if they were calculated upon the basis births among each age group. Data are not available for computing such rates.

NOISE RETARDS APPRECIABLY THE RECOVERY OF SICK PATIENTS

Along with insistent claims as to the value of music and the harmonics generally as assisting therapeutic agents, contention is made that raucous and dissonant noises form deterrents to recovery from various illnesses; that such discords are a positive incentive to crime, and certain engenderers of numerous nervous afflictions.

Merits of quiet as an aid to convalescence have long been recognized. This therapy of repose and calm is both ancient and wise. Now to the sins of the city streets, statisticians append the transgressions of their racket and din.

The Noise Abatement Commission of New York City reports in a recent survey that

"Eighty per cent. of the hospitals in New York City are surrounded by noise sufficient to retard appreciably the recovery of patients. In almost half the hospitals included in the survey noise was found to have a really serious effect on the health of patients. In others, its effect was described as either important or annoying.

"Traffic noises, especially those made by heavy trucks, head the list of complaints. Second comes the noise made by children playing. Fire apparatus, street cars, low flying airplanes, ash and garbage collection, shots [in Manhattan] and church bells [in Brooklyn] and the omnipresent radio are other causes of noise, disturbing not only to patients in hospitals but to doctors and nurses as well.

"These figures indicate an extremely grave situation of emergency which must be immediately remedied as far as is possible under present laws by the agencies in whose hands is the enforcement of these laws," the report says. "One of the most vital functions of the city is to take adequate care of its sick. It is essential that hospitals be surrounded with almost perfect conditions of silence. How far from perfect conditions are is startlingly indicated by the figures quoted above.

"Many superintendents pointed out that the noise conditions have a detrimental effect on the patients and interfere also with the health and efficiency of doctors and nurses, thus making them less able to give the patients the best possible care. As has been shown by previous studies noise that has a serious effect on the sick has a detrimental effect upon the healthy. Many well people will be forced into hospitals by the same noise that will hinder their recovery when in institutions. The situation is grave for those already sick and serious for those who are well."

Actual statistics are lacking to indicate the ratio of noise as a contributive factor to crime. Certainly many crimes committed in a nervous frenzy may well cede to unseemly rackets a certain basic responsibility. Bad as are clangor and din on boulevards in the slums and even in the debatable districts, noise is of itself a crime.

Commenting in this regard the *United States Daily* remarks:

"Every day we pick up the newspapers to read of sensational crimes. A shopkeeper is standing at his counter when a pair of nice looking young men come in and ask him for something that is on the shelf behind him. When the shopkeeper turns his back, one of the young men pulls a gun and commands him to 'Stick 'em up.' If he shows fight, there is a tussle and sometimes the sounds of shots.

"The police sirens are heard in the streets, detectives and reporters gather at the scene of the crime and the wheels of justice begin to grind. Finally, the criminals are caught.

"The boys go to court, are convicted and spend long years in prison if they escape the chair. In any case, their lives are finished. This sad story is told over and over again on the streets of New York City. There was a time when the prevention of crime was thought of in terms of punishment; heavy sentences would, it was thought, frighten future criminals into being good. But unfortunately, this did not work. It was found that there was something in the young boys who went wrong which kept them from being good; which made them go ahead and take the risk despite of everything so that they, too, committed

crimes and the prisons became more and more crowded.

"So a new theory of crime prevention was developed. Expert psychologists and social workers began to study what it was in a boy that made him a criminal despite of everything.

"Every possible cause of crime is being studied in this city. None is so small that it may be overlooked with safety. All must be removed. It has been found that criminals have been made by prohibition, by maladjustments in school and by bad street companions. And the Noise Abatement Commission has added to the findings of other scientists the fact that the noise of the clamorous city creates a fear psychology that makes for crime.

"I am not contending that noise makes criminals. But I do insist that a boy who has lived all his life under the shadow of a rumbling and howling elevated, who has had clamorous trucks and radio loudspeakers as his perpetual childhood companions, who could not imagine what real silence means; I do contend that such a boy is more likely to be a criminal because of the noise that has bombarded his ear drums ever since he was born."

MEDICAL MOTION PICTURE FILMS

The Educational and Scientific Service Committees offer the following information about films suitable to show at scientific meetings of county medical societies.

Davis & Geck, Inc., 217 Duffield Street, Brooklyn, New York, have three films available for bookings without charge to professional organizations. Each is in four reels and is obtainable in either the 16 or 35 millimeter width and requires about forty-five minutes for showing. Requests for bookings or information should be addressed to Davis & Geck, Inc.

"The Relation of Absorbable Sutures to Wound Healing."

"Surgical Treatment of Peptic Ulcers."

"Traumatic Surgery of the Extremities."

The Petrolagar Laboratories offer to send their staff men to show the following films which are 16 millimeter in width, about 400 feet in length, and require twenty minutes for projection:

"Movements of the Alimentary Tract in Experimental Animals."

"The Influence of Drugs on Gastro-Intestinal Motility."

"The Anatomy of the Abdominal Wall."

"The Story of Cholecystokinin."

"A High Posterior Gastroenterostomy."

"Emergency Operations — Liver-Stab Wound and Bullet Wound in the Bladder."

"Multiple Diverticula of the Bladder."

"Hydrocele."

"Appendectomy."

"Colles Fracture."

"The Anatomy of the Abdominal Viscera."

"The Thirteenth International Congress of Physiologists."

Requests for these films should be made with the Petrolagar Laboratories, 536 Lake Shore Drive, Chicago and three weeks' notice given whenever possible.

The American College of Surgeons has approved the following films, inquiries concerning rental or purchase of which should be directed to the Eastman Teaching Films, Inc., Rochester, N. Y.:

Film	No. Reels	Rental Prices 16 mm.	Rental Prices 35 mm.	Sale Prices 16 mm.	Sale Prices 35 mm.
Diagnosis and Treatment of Infections of the Hand.....	3	$ 15.00	$ 40.00	$125.00	$250.00
*Intestinal Peristalsis.	1	5.00	....	30.00	....
Simple Goiter	1	7.50	18.00	50.00	100.00
Benign Prostatic Hypertrophy	1	7.50	18.00	50.00	100.00
†Indirect Inguinal Hernia	3	20.00	45.00	140.00	275.00
†Indirect Inguinal Hernia	2	15.00	35.00	95.00	190.00
†Indirect Inguinal Hernia	1	7.50	18.00	50.00	100.00
The Technique of Blood Transfusion...	2	15.00	35.00	95.00	190.00
Ectopic Heart.....	1	7.50	18.00	50.00	100.00
The Treatment of a Normal Breech Presentation	2	15.00	35.00	95.00	190.00
Acute Appendicitis (Professional)	2	15.00	35.00	95.00	190.00
Acute Appendicitis (Lay Public).....	1	7.50	18.00	50.00	100.00
Development of the Fertilized Rabbit's Ovum	1	7.50	18.00	50.00	100.00
Tests of Vestibular Function	1	7.50	18.00	50.00	100.00
*Amyotonia Congenita	1	3.75	....	25.00	....

*There are no 35 millimeter prints of these films.

†Since each reel of this picture is complete in itself, any one of them or any combination of them can be used to advantage. Subject matter of the three reels: Reel 1—Anatomical Aspect of Hernia; Reel 2—Clinical Aspect of Hernia; Reel 3—Operative Technique of Hernia.

The Alumni Motion Picture Foundation of the Chicago Lying-In Hospital and Dispensary, 5841 Maryland Avenue, Chicago offers the following

films which have been produced by Doctor J. B. DeLee:

1. Forceps Film—giving the history of forceps, the indications for the operation, the low forceps and forceps in occiput posterior position. (4 reels 35 mm. film) (4 reels 16 mm. film).

2. The Treatment of Face Presentation—showing the method of conversion to occiput presentation with forceps in deep transverse arrest, and then a case of Face Presentation which terminates spontaneously. (4 reels 35 mm. film) (4 reels 16 mm. film).

3. Craniotomy on the Dead Child. (3 reels 35 mm. film) (3 reels 16 mm. film).

4. The Prevention and Treatment of Eclampsia—showing the prenatal care of the toxemias of pregnancy, the treatment of actual eclampsia and 2 patients having convulsions and autopsy findings in 1 case. (3 reels 35 mm. film) (3 reels 16 mm. film).

5. Injuries of the Newborn—showing cephalhematoma, fractures, etc., with treatment of same. (2 reels 16 mm. film.)

Laparotrachelotomy or Low, Cervical Cesarean Section—giving the history of the operation, surgical operating room technic, local anesthesia, the operation itself, the variants had complications usually met and post-partum care. (8 reels 35 mm. film.)

*N. B.—A rental charge of $2.50 per reel for the 16 mm. size, and $5.00 per reel for the 35 mm. size is made, plus transportation charges both ways.

THE UNIT OF OUR EXISTENCE IS THE COUNTY MEDICAL SOCIETY

Dr. Harry M. Hall, former president of the West Virginia Medical Association, offers the following as to the future outlook of medicine. We quote:

"Medical societies, we think, are going to pass through a rapid metamorphosis in the next five years, and, in the end, they will either be one of the strongest aggregations of determined men ever gathering together in a single human endeavor or they will be nothing but a name. We will all have to see that this is what civilization is leading us to, ourselves, or outside forces quite beyond our control are going to make us realize it. From a number of courses the individual integrity of a medical society is going to have its structure tested—the unit of our very existence is the county medical society. . . ."

Correspondence

I HAVE NEVER GIVEN ENDORSEMENT TO ANY COLLECTION AGENCY

September 26, 1931.

Dear Doctor Whalen:

Some time ago I had a caller in my office trying to interest me in an "unusual" method of collecting bad accounts. The method in this case was for the Agency to take the account, get a note from the debtor, and then discounting it 20% pay the physician immediately. I was asked to make an investigation through suggested sources, as to the reliability of the concern. I did not follow instructions, but did make investigations through our own local Chamber of Commerce, and as the information received in this way did not correspond to the claims of the salesman, I failed to sign a contract.

My attention has been called to the fact that a representative of this concern is now showing to prospective clients, what is claimed to be copies of telegrams sent by myself, and the replies received relative to the standing and reliability of this company.

I hereby wish to state that I did not send any telegrams, nor did I receive any relative to this or any other similar company, and any statements made to prospective clients that I have heartily endorsed any collection agency are entirely false.

I am prompted to issue this warning because one of my good friends in another part of this state was shown such a telegram, stating that I recommend the concern to my friends, and on the strength of this alleged endorsement the friend signed a contract. He now states that the company has collected funds from debtors, and has failed to remit to him the amount due. My experience with Collection Agencies has been disappointing, and I have never yet given an endorsement to any of them, so any statements to the contrary are entirely untrue.

HAROLD M. CAMP.

EFFICIENT MEDICAL SERVICE FOR THE SO-CALLED MIDDLE CLASS PATIENTS

Chicago, Sept. 24, 1931.

To the Editor:

Your many constructive editorials on the economics of medicine which have appeared regularly in the JOURNAL, prompts me to send you the following contribution for publication. I am sending it in the hope that my article will throw some additional light on the perplexing problem of giving efficient medical service to the so-called middle class at a cost in conformity with their limited income.

In the last thirty years medical progress has been so nearly miraculous as to partake of the incredible.

To acquaint the laity with selective discretionary power towards the use and possession of this medical knowledge is a difficult and a delicate, yet a pre-emptive and imperative duty. One handicap stands rooted in economics.

Expense and efficiency to a large extent go hand in hand. Increasing costs wait upon knowledge as good digestion waits upon appetite.

Modern medicine insists upon complicated examination with expensive apparatus, and often the assistance of expensive specialists as a preliminary to diagnosis with attendant increasing costs that become too big a burden to pass to people of small incomes. In a government survey of several hundred thousand wage earners, it is shown that 80 per cent. earn less than $2,000 annually. Surveys by the "committee on cost of medical care" show that about 20 per cent. of the cost is represented by the doctor's fee and that 80 per cent. goes to institutions both scientific or lay, and lay persons for services and supply.

The medical man's inability to control this 80 per cent. outlay has resulted in those mounting costs that give rise to the development of free and low price clinics for treatment. These clinics when under lay control are a boomerang to scientific medicine and ultimately will destroy medical progress. All medical dispensation should come from medical hands and even in the unavoidable lay angles should be under medical control.

With medical progress producing possible clinic demand there have developed medical organizations and corporations controlled by lay people, with money furnished by endowment, philanthropy or taxes. Originally such lay-medico units were places where medical services were dispensed free to the deserving poor. But these same units appear now as great organizations able to spend millions of dollars a year upon engendered costs other than medical services. Generally speaking, doctors devote their time to these clinics without pay just as clinics lacking lay control are all at the expense of individual doctors. These lay-medico organizations have had their greatest growth during the last ten years. Outstanding examples include a much advertised lay public health institute and the University of Chicago clinics. This institute attracts its patients by advertising but limits its work to venereals. It is organized as a so-called "Not for Profit" organization. The University of Chicago is a pay clinic organized to provide all types of medical care for people of small means. More recently medical men have complained that it is treating people able to pay the regular fee of physicians. These organizations as well as others studied are owned and controlled by lay people who are not medical minded and not properly sympathetic to the general practitioner. These corporations give as their excuse for existence the inability of patients from low income groups to pay for continuous or specialized care.

In addition to "Not for Profit" organizations, as they term themselves, one must mention numerous and increasing industrial, religious and insurance organizations that are administering medical services to their members, employes or policy holders. Something must be done to straighten out this clinic crisis. One group of medical men meeting to evolve some plan of co-operation that would provide a service for these low income groups, and protect the profession at the same time, were appalled at the situation's intricacies. So surveys were made of many types of medical organizations, both industrial, insurance and hospital, and ordinary dispensary units. This work was carried on by physicians deeply aroused in this problem.

Out of the different organizations studied, a series of ideas were evolved. It seemed as though any effort to provide medical care for people of small incomes with adequate protection to the medical profession must have as a background the co-operation of the whole profession.

Certainly the efforts made by the County So-

ciety to control the further development of lay organizations entering the business of medicine have met with little success. Consideration of the reasons for failure to control and limit these lay efforts seemed to indicate that all argument was lost because medicine had failed to provide a service for these people of small means. This left the door open for the development of the organizations.

After much thought it was believed that if the County Society would form or endorse an organization from its membership that a way would be found to provide adequate medical care with protection to the profession.

An organization so formed under the scrutiny and supervision of the County Society could invite the participation of all doctors with the understanding that all savings effected would be available to their patients, and that profits, if any, over and above the cost of further developments would be divided among all doctors participating.

Could such an organization, if authorized, choke off further similar activities by lay organizations?

Could approval be given a corporation formed by doctors with the understanding that participation would be open to all doctors?

Objections to corporate medicine, suggested partnerships. Scrutiny of the pitfalls of partnership make corporate medicine seem better. Objection to an educational program as carried on by purchased publicity, might be met with the statement that there can be no ethical objection to dignified education even if paid for, when carried on by an organization representing all the doctors. Paid publicity might help to develop and control public opinion and interest in medicine, with benefit to the medical profession and the general public welfare. Paid educational publicity might control and prevent charlatism, quackery, fraudulent cults, patent nostrums, etc. More important, it might do much to make the public "health conscious" thereby stimulating preventive medicine, constantly influencing the public to consult and advise with the medical profession on all matters pertaining to the treatment and prevention of disease.

Many may think an endorsed low cost clinic is dangerous, and might take patients from regular physicians. Such service, though perfect medically but completely impersonal, would encourage people able to pay, to consult their family doctor. Some suggest that the patient be known by number instead of by name and that the clinics be accessible but not luxurious. Income level, or limit of those to be served by the clinic, might be fixed and set at certain limits referring all others back to the family physician. This income level, controlled and fixed, would be a decided improvement over present clinics run by lay people who make superficial or no investigation of the patient's ability to pay the private physician. If such a medically owned clinic should ever be formed all employed medical men should devote their entire time to the work and adequate salaries be paid them. Further, this could be supplemented by consultants in the various departments at part time but with financial return. Such a medically owned corporation should be organized for profit and all or as many doctors as desire should participate. Profits, if any, over and above the amounts for further development, should be returned to the stockholders in the same way that profits are divided in any corporation.

These ideas and many others too numerous for this letter, have been gone over in great detail, always with the thought of delivery of adequate medical services to all people with protection to the medical profession. Any effort endorsed by the medical profession must carry out certain definite objective outlined as follows:

1. Hold the practice for the benefit of the people and the medical men.
2. It must bring the control of organized or corporate medicine back under the control of the medical profession organied for this purpose.
3. It must develop and operate a medical organization for the purpose of furnishing all medical service to the people of small incomes within their ability to pay.
4. It must obtain adequate remuneration for all men qualified to act as doctors, employed by all organizations, with due regard as to their value and the organization's ability easily to pay the same.
5. It must promote association and co-operation with existing medical organizations and protect all charitable service for those who are unable to pay.
6. It must use all existing medical organizations without adding to them unless absolutely necessary, by demands of patients for facilities

greater than those that are available or do not exist.

7. It must decrease the cost of medical service apart from the physician's fee to higher income groups served by the physicians in their individual practice of medicine.

8. It must make available to all patients of doctors in individual practice, all drugs, supplies and sundries ordered by the doctor at low cost, thus decreasing his patient's total cost of medical service.

9. It must make available all costly facilities developed by the organization in the way of laboratories, x-ray, radium, etc., to all doctors at the same cost as is charged the low income groups.

10. It should make accessible all other cost saving facilities for the benefit of all physicians in their purchase of supplies and equipment.

11. It should assist the doctor in his individual practice through making available to him inexpensive and complete consultation and diagnostics service to people of small incomes.

12. It should make hospital facilities available to patients of all doctors, enabling them to treat them under their own direct care and supervision and at the same time have the advantage of calling upon the hospital consultation service for such advice when necessary, without extra charge, in relation to specified low income groups.

13. It must provide a loan service that will enable the patient to pay his bill promptly and not increase the cost of medical service to the patient.

14. It must make available all the advantages of a low cost organization to all doctors, whether participating members in the organization or not.

15. It will distribute the results of profitable management, above the costs of operation and further developments necessary, among all the doctors participating.

This plan is offered for a discussion and action by the medical profession. It is a plan not competitive with the doctor in his individual practice. It would aim to County Medical Society control over the development of medical organizations and the character of the paid educational publicity. It offers constructive ideas to the furnishing of a low cost medical service to the people with full protection to the medical profession.

CHARLES R. WILEY, M. D.

MECHANISM OF EDEMA IN RELATION TO CLINICAL CLASSIFICATION OF BRIGHT'S DISEASE (NEPHRITIS)

Henry A. Christian, Boston (*Journal A. M. A.*, Aug. 1, 1931), has found edema a very useful basis of classification of Bright's Disease along with a time division into acute, subacute and chronic. Using these criteria he has formed a clinical classification that has been very helpful. Properly to apply edema as one of the criteria of classification of Bright's disease or nephritis necessitates a reasonable understanding of the pathologic physiology of edema, and although the mechanism of edema is very complex and as yet far from thoroughly understood, recent investigation carried on in many different laboratories has added much to the knowledge of it, so that one is in a position so to formulate this knowledge as to aid in an understanding of the several types of Bright's disease. It is obvious that edema or the appearance of abnormal amounts of fluid in tissues and body cavities does not arise always from the same cause or, so to speak, does not always have the same mechanism. This permits one to subdivide edema into seven clinical varieties: cardiac, hepatic, renal, nutritional, anemic, inflammatory and anaphylactic edema. Of these varieties of edema, cardiac and hepatic edema have a very similar mechanism; in the same way renal, nutritional and anemic edemas are closely related as are inflammatory and anaphylactic edemas. In the mechanism of these several varieties of edema there are concerned six significant factors: filtration pressure, osmotic pressure, permeability of vessel wall, salt content of the tissues, lymphatic drainage and nervous control. The exact part played by each factor is not fully understood as yet, and, when they act in various combinations, great complexity may enter into the process. However, a reasonable understanding of the mechanism of edema may be obtained by analysis of the action of some of these factors in a somewhat schematic way. This relatively simple clinical classification is a practical, easily applied and useful grouping of patients with Bright's disease. Almost every patient can be placed properly in the classification after relatively simple clinical study. Hence the author commends its use.

CLINICAL STUDY OF ASCARIASIS

A. E. Keller, Horton Casparis and W. S. Leathers, Nashville, Tenn. (*Journal A. M. A.*, Aug. 1, 1931), studied the clinical conditions found in 107 cases of ascariasis in white children and in 60 cases in Negro children, with 54 white controls and 69 Negro controls. A history of disturbed sleep was obtained in 60 per cent. of the cases in white children and in only 15 per cent. of the white controls, while in only 20 per cent. of the Negro patients and 22 per cent. of the Negro controls was this complaint present. Abdominal

discomfort was present in 70 per cent. of the white patients and in only 7.4 per cent. of the white controls. It was present in 60 per cent. of the Negro patients and 30 per cent. of the Negro controls. The physical conditions were those which can be demonstrated in any average group of rural children. Protuberance of the abdomen was present in 60 per cent. of the white patients and in 22.2 per cent. of the white controls. It was present in 33.3 per cent. of the Negro patients and in 23.3 per cent. of the Negro controls. There were no significant changes in the total red blood cell counts, hemoglobin or total leukocyte counts in the cases and controls as groups. The differential leukocyte counts revealed an average eosinophilia of 8.9 per cent. for the white patients and 5.3 per cent. for the Negro patients. Both white and Negro controls had eosinophil counts which varied from zero to 10.5 per cent. The average eosinophil count, however, for both control groups was 2.9 per cent., which is considered normal. The eosinophilia does not appear onstantly in cases of ascariasis, 16 per cent. of the white patients and 31.6 per cent. of the Negro patients showing an eosinophil count of 3 per cent. or less. No definite correlation between eosinophilia and the intensity of infestation could be demonstrated. No correlation between the age of the patient and eosinophilia could be shown. This analysis presents a few observations on which a clinical diagnosis of ascariasis may be based. The parasite causes abdominal discomfort and disturbed sleep. That the parasite causes some disturbance in the host is seen by the presence of eosinophilia. The negative clinical observations that are presented emphasize the importance of the routine examination of feces in a diagnosis of ascariasis.

AVITAMINOSIS: III. SPECIFIC EFFECT OF VITAMIN B ON GROWTH AND LIPID METABOLISM: LIPEMIA AS SYMPTOM COMPLEX IN THIS AVITAMINOSIS

For the past four years Barnett Sure and Margaret Elizabeth Smith, Fayetteville, Ark. (*Journal A. M. A.*, Aug. 1, 1931), have been searching for a symptom complex in vitamin B deficiency as may be evidenced by the blood chemistry picture. Their results, however, were, in the main, negative. They have considered of little clinical importance the anhydremia and the increase in the nonsugar reducing substances of the blood, which were frequently encountered. They feel, however, that their present observations may serve as an aid to the diagnostician, since they indicate the presence of a marked lipemia, i. e., a large increase in the concentration of lecithins, fatty acids and the iodine number of the fatty acids, indicating unsaturation, in lactating mothers and nursing young and also in weaned animals, in this avitaminosis. Since there has been no definite yardstick by which to measure vitamin B deficiency from the standpoint of chemical analysis of the blood, as, for instance, the low phosphorous concentration in the case of rickets, it has been difficult to diagnose, positively, borderline cases of vitamin B deficiency as it exists in the United States; and it is hoped that a chemical study of the lipids of the blood will prove helpful to the clinician as a guide in vitamin B therapy, particularly in infant nutrition, in which anorexia is a common symptom complex.

TREATMENT OF CHOREA BY INDUCTION OF FEVER

Lucy Porter Sutton, New York (*Journal A. M. A.*, Aug. 1, 1931), has treated twenty-four choreatic patients with intravenous injections of typhoid-paratyphoid vaccine as a means of producing fever. The results thus far have been good. There has been prompt cessation of the symptoms, and the course of the disease has seemed to be greatly shortened. In the cases reported the average duration after treatment was started was from eight to nine days. This treatment has been much more satisfactory than any other used at Bellevue Hospital on the Children's Medical Service. It appears to have definite advantages over phenyl-ethyl-hydantoin.

LARYNGOLOGY IN RELATION TO DISEASE OF HEMATO-POIETIC SYSTEM: ESPECIALLY PURPURA AND AGRANULOCYTOSIS

According to Claude L. La Rue, Shreveport, La. (*Journal A. M. A.*, Sept. 26, 1931), purpura and granulopenia are serious diseases presenting difficult problems to the laryngologist. They are signs of imperfect balance between regenerative and degenerative activities of the myelogenous system. From present knowledge, sepsis, of varying type and degree, seems the most likely etiologic explanation. A condition of exhaustion, associated with pharyngitis and granulopenia, but with no other physical observations, seems fairly common. It is possible that certain unexplainable states of physical and mental depression, so-called nervous exhaustion, neurasthenia, and the like, are due to a lack of granulocytes, caused in turn by infection gaining entrance through insignificant pharyngeal lesions. Opportunity to determine more definitely the function of the granulocytes lies within the field of laryngology and is an added reason why examination should include as a routine, a study of the blood.

EPITHELIOMA OF FACE

Gordon B. New and Fred Z. Havens, Rochester, Minn. (*Journal A. M. A.*, Sept. 5, 1931), believe that primary complete removal of epitheliomas of the face by surgical measures, including surgical diathermy, is the treatment of choice. For the treatment of inactive lesions, the growth may be excised or removed by surgical diathermy; the tissue removed may be replaced by a full-thickness skin graft or a pedicled flap, at the time of the primary operation. Active lesions, frequently recurrent lesions, and regions which have been subjected to radiation with involvement of cartilage of bone are best destroyed with surgical diathermy, the deformity being disregarded. Reconstructive surgery should be delayed for at least nine months to a year. The gland-bearing fascia which drains the primary lesions should be removed in cases of carcinoma of the lower lip.

Original Articles

MENTAL HYGIENE IN THE FAMILY*

FRANK PARSONS NORBURY, A. M., M. D., F. A. C. P.
Medical Director, Norbury Sanatorium
Member National Committee for Mental Hygiene
JACKSONVILLE, ILLINOIS

THE FAMILY

The family is the social unit of human relations. It is the oldest historical institution in the world. According to Westermarck, it has proceeded, uniformly, with endless minor variations from the anthropoid ancestors of man, on to the present day civilization. Marriage and the family are most intimately connected with one another; it is originally for the benefit of the young that male and female continue to live together. From the family the State itself was derived, likewise the church, school, industry and other institutions recognized as parts of creative social evolution.

Its Biological Foundation. To understand the family as a social unit it is necessary to understand the biological foundations, upon which rests the evolutionary adaptations to family life. Popenoe says, family life is not often considered from the biological point of view because biology forms a small part of formal education, and also because the normal biological factors are particularly intimate and perhaps, some of the abnormal, unpleasant to contemplate. Biologically, the normal family may be defined as one in which two adults live together and give birth to an appropriate number of healthy and intelligent children, whom they bring up to lives of usefulness. The question of family implies, as Westermarck emphasizes, the question of marriage. Marriage according to the custom, traditions of Western Civilization, has meant a family and children. There was a time when, if no children were born, the marriage could be, and may have been, automatically dissolved. But, in this day and age of birth control, marriages at the outset may be, and many are, planned to avoid procreation permanently, or at least to limit the number of children born, to become members of the family. The control over the size of the family is a distinguishing feature of modern Western Civilization. Havelock Ellis says, that is becoming a characteristic of our marriage system, and is of immense significance in relation to the family. Not that it can affect the existence of the family, as such, since that rests on a biological foundation that cannot be destroyed. But, it furnishes an altogether new control over the forms the family may assume and renders the family adjustable, in a way that has never before been possible to the developing directions of our general organization. The size of the family concerns the mental hygiene problems originating in it. The size of the family involves the eugenic problems of birth control as a factor in selection, both in its biological and social significance. Biologically the conservation of the family concerns us all. Popenoe emphasizes this paramount social issue as having its foundation in biology when he says, "the family is primarily, though by no means exclusively, a biological question and it has not usually been examined from the biological side. It is significant that there are few biologists among those who are crying out so loudly for the break-up of the old-fashioned home. As soon as the family is studied biologically, it is seen to represent an evolutionary adaptation for the benefit of mankind. The family, therefore, is no more out of date (except in the movies) than is man's habit of walking upright which is likewise an evolutionary adaptation." Popenoe expresses his belief, "that, to a large degree, the difficulties in which the family now finds itself are due precisely to the fact that isolated and individual cases have been multiplied and held up to astonish the public." (This may be attributed to the medium of the movies and, too, by the yellow journalism and trashy news stand current magazines literature.) Sight has been lost of the broad underlying facts and principles.

Its Social and Economic Factors. The existing social and economic organization of society is very much in the forefront of public discussion, as evidenced in dependable magazine literature and the proceedings of the recent White House Conference on Child Welfare and of the great number of societies and associations, engaged in search for solution of the very varied problems paramount as social issues of today. It is quite evident as we read these proceedings and the vast literature on child welfare, mental hy-

*Read before section on Public Health and Hygiene, Illinois State Medical Society, at East St. Louis, Illinois, May 6, 1931.

giene, birth control, eugenics and genetics, that as yet there are no final solutions to these important problems. Just recently there has been brought into public controversy from the socio-religious point of view, the question of birth control, in which Pope Pius XI issued his opposing historical encyclical letter. This was precipitated by a previous favorable report (a Protestant pronouncement) made by a House of Bishops. Such an important controversial question has its direct and indirect effects upon the family and racial future as viewed from the standpoint of biological foundations of society. We, as physicians, must appreciate the essential significance of the eugenical values of birth control. Due scientific consideration of the immutable human biological principles involved, is an imperative need on our part because these principles affect the life of man as an individual, his family and his institutions. Prof. Hankins of Smith College says, "Birth control is, without question, one of the most momentous movements now affecting the evolution of western people. It is vastly more significant from the long time view point, than such matters as the tariff, immigration, prohibition enforcement or the stock market crash, which ordinarily engages the thought and energy of the official guardians of the welfare and future strength of the nation. It is a reasonable opinion that social welfare could be enormously enhanced by a reduction of the rapidly growing burden of the thousands who ought never to have been born." Moreover, the future character of Western civilization depends largely on the outcome of the decisive battle now being waged between the advancement and popularization of scientific knowledge and view points concerning the family as an institution on the one hand, and the ancient enemies of the family, igorance, superstition, unregulated control over motherhood, with its wasted and depleted physical resources incidental to excessive childbearing, deplorable abortions, birth of defective children and the devastating effects of fears, worries with associated neuroses and psychoses. We, as physicians, are confronted with these important problems most of which can be eliminated or at least attentuated, by a sound eugenic program for social welfare and race betterment, based on sound ethical effective measures for birth control and a defined practical, workable, mental hygiene program that will concentrate on the emotional life of man.

Its Emotional Upheavals and Behavior Problems. Again, as physicians, we are well aware of the fact that the family and the individual as social aggregates are beset by infinite and varied emotional problems, causing grave and sudden upheavals, such as follows economic disaster, wars, floods, droughts, earthquakes, and other events which produce strokes of ill fortune and inhibit and perturb social evolution. As evidence, we have the experiences of the turbulent years of social upheaval incidental to the World War and now the present economic disaster, which on a large scale, affects thousands. In consequence of which the world is in a state of instability and stern realities are facing us on all sides. We are confronted by evidences of nervous breakdown of society itself, of its social units—the family—to say nothing of the psychiatric problems of the individual which are constantly intruding themselves into the family life, affecting its social integration. The position of the family at such times of stress and perturbations is fully expressed by Harriet Townsend who says: "The family in a changing world has come through the shocks and storms of social upheavals with its integrity impaired to be sure, but no satisfactory substitute has been found for its primary functions. The family continues to be the training center for little children and a physical and spiritual base from which youth goes forth, fortified in body and spirit to adventure into new and untried associations." Here is where mental hygiene, as a science, in its application to the problems of the family, the individual and, too, the community, has a strategic point of attack which aids in tracing effect to cause. Those of us who deal with, and have thrust upon us, the very varied problems in human behavior, are quite aware that their practical clinical interpretation necessarily involves the essential facts of home life, because the home as the base from which individuals go forth to establish their own independent social existence, is responsible for, and the creator of, the behavior patterns, which govern the individual in the complex conditions of his after life. If purposive activity follows wholesome culture of patterns which parental foresight developed and supervised, then these cultural heritages promote the unfolding of native personality traits in a

wholesome socially constructive manner. Mental hygiene, modern psychiatry and psychology, deal with the instinctive emotional life of man, in its social heredity, its cultural heritages, its native hereditary personality traits, and the behavior reactions related to environmental relations. Thus, we are made aware of the enormous influences of parental types of the family in its interrelations, its institutional potentials, embodied in the code of family life and with the conflicting patterns of neighborhood and community life. Doubtless many of you wonder where and how does the family physician fit in a program, that proposes to solve the problems of this individual which are largely representative of reactions, of heredity, environment and circumstance? My answer is that the philosophy and technique of mental hygiene, as applied to the family and the individual justly and rightly comes within the purview of medical service. And, for the reason, as stated by Appel and Smith: "Our point of view is well expressed when we say that a nervous breakdown is usually an emotional breakdown—a disorder, a disturbance of the emotions. If this is so, the breakdown has none of the finality and necessity that we are wont to associate with the word 'disease.' The reaction seems, to a great extent, to be psychologically determined, caused by the individual's emotional response to a given situation. This is the meaning of the term 'phychogenesis'." Therefore, it is possible to approach these conditions from the point of view of psychology (which all physicians unconsciously use). In the great majority of cases both in children and adults such an approach is not only necessary to ascertain the type of personality, the behavior patterns (the problems of personal organization), but it is superior to a straight organic, medical approach. "The physician of today who ignores the emotional aspects of the patient's personality may be ignoring the most important factors in the condition. Physical, organic, toxic, infectious and hereditary factors must, of course, be taken into account when important, but in nervous conditions especially or in cases of marked unhappiness and inefficiency, whether in vocations or at school, personality reactions are most important." If the psychological approach to personality difficulties or nervousness is important, there is little need to emphasize the value of mental hygiene in family life.

Its Educational Program for Mental Hygiene. Mental hygiene should permeate the whole educational program from infancy, through the period of adolescence and also into adult life. Child guidance has become the slogan of modern mental hygiene. Parental education, too, is one of the advanced ideals that has for its objective and stabilization of conventional family life and the interrelations of parents and children, considering the essentials of what may be regarded as norms of familial behavior patterns. Burgess "believes the conventional schematization of familial interrelationships is not to be dismissed as unimportant. To the contrary, it is our expression of our deepest sentiments and of our most profound convictions of what family life ought to be." True, family ties are shifting, and changing, and this changing world, due to the advent of various new ways of living, of which may be mentioned the apartment house with its restricted environment, the hotel life with its decadence of family traditions, the employment of married women outside of the home and other narrowing influences which reduce the points of contact of the family with wholesome environmental conditions, are having their effect in producing lopsided personality development in children, thus inhibiting their equipment to meet everyday life. We, as physicians, are made aware of these lopsided personalities with faulty mental attitudes and emotions, which are traceable to lack of child guidance. And whose early life twisted by environment and circumstance never reach the goal of stable, dependable personal development. Let us not forget "that as the twig is bent the tree is inclined." The bending of the twig of mental life and the moulding of personality are the logical sequences in the development of creative intelligence, the patterns of which are taken from the life world about the child. Education lays the foundation for the evolution of a personality; environment and circumstance join to build the superstructure. Education, according to Osborne, is such a vastly comprehensive term that it included every power and function of man as a whole and of every cell of which a man's body is composed. You cannot detach the education of the cells of the frontal lobes which distinguish the higher order of human brain from the education of the cells of the liver which supply the frontal lobes with chemical reactions necessary to pure thought."

Mental hygiene would have us always keep in mind the three fundamental factors in child development and character building, which concern us as clinicians, namely; heredity (including social heredity), environment and circumstance, the clinical values of which are in the order mentioned. The importance of heredity, as delineated in the science of genetics is coming to be recognized as a crying need in racial development. Genetics and eugenics, as mates in the purposive improvements of the human race in social specialization and cooperation, have made great progress in recent years. The same is true in the advance in intelligent control of the environment. Social organization includes environment which now with increasing illimitable forces made available by science, has become a very potent factor in shaping the social course of the family, the individual and not least, the community. There is evidence everywhere, that the environment in family conservation is now of paramount importance.

Its Social Course in Everyday Life. More and more thoughtful people are realizing that good family life, in spite of all of modern conflicting conditions, can be maintained here and now, if the self-evident truths of child guidance, parental education, and regulated school and community environment, be accepted as moulding agencies, that inspire in and create for the child, right attitudes toward life and give creative values to the motives which actuate their everyday living. Mental hygiene believes in philosophy of home life, which as an environmental and circumstantial factor, will contribute to the child a practical broad usage of the opportunities thus created, that it may respond to these opportunities quite normally in its own volitions. True, these volitions need training. Here is where child guidance, utilizing the cooperative organization of the family with its intelligent comprehension of the world of facts, physical and spiritual, calculated to create and sustain interest in realities. Mental hygiene would have the child guided in its normal life of activities and interest, that in the genetic development of its dynamic capabilities, there shall be an unbroken line of achievements. Growth from the plastic period of childhood, on to adolescence is following the behavior patterns which environment and circumstance have laid down. The parents, in safeguarding the welfare of their children during these formative years, should have the benefit of modern specific knowledge of mental life of the child, as developed by research, discriminating observation and sane study of the genetic evolution of mind. In so doing, they will better understand child-life and the individual problems of their children. No two children are alike and no two respond to the same stimuli of family life. What will create a faulty mental attitude in one, is no criterion of what will be the result on the other children. Burnham's "Normal Mind" is today one of the most practical constructive contributions on mental hygiene, that has yet been published. It should be in the library of every physician who has thrust upon him, only too frequently, the problems of child life in the family. Burnham's dictum, "A normal integrated personality is developed for purposeful activity, in doing one's own tasks—individual and social, is worthy of the family physician's consideration. Mental hygiene, in its office, desires to contribute its accumulated knowledge to aid parents to have a sympathetic understanding of the development of the mental life and evolution of character of the child.

Its Problems in Child Guidance Including Adolescence. The development of the child is, really, one of the greatest scientific problems of mental hygiene and social psychology. The environment of family life, with its traditions good or bad; with parents displaying stability or instability, with emotions controlled or uncontrolled; with training good, bad or indifferent, these are the moulding factors which are to influence, for weal or woe, the social and mental life of the child. It is largely the traditions of the adult and the influence of environment and the ideals of environment and the ideals of society into which a child is born, which suppress, modify and obliterate his inheritance and make him what he is when he reaches adult life. Williams tells us "there are no adults, that we all are in our adolescence, insofar as our behavior reactions indicate. These behavior reactions are simply those of adolescence, not yet solved and the reason we get ourselves, our children and their children into such a lot of emotional hot water, is simply that we have not grown up. It is with emotional difficulties, which come from deeper than body or intellect, that we clinicians deal. The progressive failures of youth and maturity strew the way to the juvenile and criminal

courts due, to a great extent, to the fall from the higher estate of childhood and its potentialities for good, to that of maladjusted, anti-social, disrupted and misdirected endeavors of the individual to develop normally to maximal maturity; he fails to grow up." Williams reminds us that "it is not economic conditions alone that are changing the American home so rapidly. These forces are, at the moment, so strong that they would, undoubtedly, make for some reorganization, even under conditions more unfavorable to them; but these economic forces are aided and abetted by conditions within the home itself. Were the home not under the present economic pressure, the same result eventually would be brought about by the dynamic forces within the home itself." "The home does not offer a sufficient, suitable emotional outlet for the average person who enters upon homemaking." "A home is an adult institution. For two emotionally adult individuals it offers an outlet for the greater part —not all, of course—of their emotional needs." Williams further says, "when one considers the number of individuals whose domestic difficulties by their very nature are obviously due to lack of emotional development, and those ordinarily considered happy, well adjusted and successful, but whose very strivings and methods show an equal lack of development, one is prepared to find in examining an institution so dependent upon adult emotional development as the home, a complex situation full of difficulties when two individuals demanding of a situation more than it can give, with at least one limited almost entirely to this situation, life takes its course over the ups and downs of neurotic victories and compromises." "Home becomes a place of conflict, openly acknowledged or bravely denied. Into this children are born and the place becomes one of infection, an infection more pestilential, perhaps, than the bacterial diseases usually so classified. Its ramifications, its paralyzing effects are only beginning to be perceived." "Emotionally immature parents infect with their own infantile and childish reactions, their children who are, thereby, prevented from attaining a healthy emotional maturity themselves and another group of parents is produced as unhappy and inadequate as the first." I have purposely quoted this very pointed but true comment of Williams on the infected home, as it falls to the lot of the family physician to meet just such problem cases. Not only sympathy for, but a study of, the family situation thus becomes a feature of the doctor's work. Here is where natural aptitude and a broad knowledge of human nature enables the physician to have understanding and comprehension of the problems in hand. However comprehending the good physician may be, it is a difficult job to quiet the endless diversity of fears, sorrows, suffering, sins of omission and commission, disappointed hopes that torment the body and soul, derange the body's repose growing out of these many troubles. Here is where skill, tact and applied wisdom penetrate beyond the bodily ills to the spirit of the individual. All of you have experienced such situation where "it is far less easy to dispel the spiritual upheaval reflected in disturbances of health, than the ravages of physical disease." "It demands more human insight, greater patience, more kindly consideration of traits, the result of family mental infections, than the more concrete problems of internal medicine." Here, something more than trained physical diagnostic skill and more subtle than simple reassurance, is required and demanded. From such experiences are born the realization that the family is one of the most vital social influences.

Its Problems of Education for Family Life. To make the family the responsible institution it should be in human welfare, requires education for family life. This education for family life not only begins with the infant in the home, but this is the beginning of parental responsibility where example and precept of the parents lay down the heavier patterns, which are to mould the character of the child. Let us not forget that the mould of personality is born with us, character we achieve. No real parent will sidestep responsibility. But the untrained parent, mother or father, does sidestep, through ignorance and perhaps purposely, when they fail to face all critical situations squarely; fail to meet the duties thrust upon them and thus losing the value of satisfaction of knowing that they are custodians of the family which is the central fact in human life. The ultimate goal of every individual is happiness. The vital influence of happiness is no more clearly defined than the contribution which parents can make in guiding the genetic evolution of the mind of a child. There is then inculcated a sense of responsibility, that goes back to the conception of the life of that

child. The meaning of that conception which largely determines the parent attitude toward that child after it is born and the development of the child into a responsible citizen. The emotional attitude toward sex life and parenthood enters here with marked potentials for weal or woe as to the happiness of married life and the altruistic endeavors which may eventuate from the family as a factor in human welfare. The trend of modern education for parenthood is to begin with the child, to create a favorable attitude toward sex and parenthood which the child adopts before he is five years old, because the attitude thus early adopted is the attitude toward family life which will prevail in later years. Many colleges for women have recognized the practical social need for training in parenthood, notably Vassar, where the human side of parenthood is taught in a truly practical and scientific manner. The psychology of sex is presented as would be the history of Rome and the scientific side of the physiology of the birth of a human being, as would be the laboratory study of other physiological functions of the human body. This is as it should be. The mental life of the child in its genetic evolution as well as the modern studies of the physical care of children become a part of parental education. Then, too, marriage as a human institution needs to be studied, and married life including sex life—leading to the "Ideal Marriage," should be a part of everyone's education, and especially those contemplating marriage. Mental hygiene in the family with its wholesome and lasting benefits in the progress of social evolution, is much more a part of the purview of medicine than it is of sociology or allied humanities. "After all it is human intelligence, intelligently directed by those who understand human beings, that must and will direct the tasks of social welfare, human welfare, in the problems of prevention, conservation and progress of mental health."

REFERENCES

1. The History of Human Marriage. Edward Westermarck. Allerton, New York.
2. Conservation of the Family. Paul Popenoe. Williams and Wilkins, Baltimore.
3. Whither Mankind, edited by Charles A. Beard. The Family, Havelock Ellis. Longmans Green and Company, New York.
4. Human Biology and Racial Welfare, edited by E. V. Cowdry. The Influence of Education, John Dewey. Paul Hoeber, New York.
5. The Normal Mind, William H. Burnham. Appleton Press, New York.
6. Adolescence, Studies in Mental Hygiene, Frankwood E. Williams. Farrar and Rinehart, New York.
7. Heredity and Selection in Sociology. Chatterton Hill. A. and C. Black, London.
8. Personality, edited by Ernest W. Burgess. The Family and the Person, Ernest W. Burgess. University of Chicago Press, Chicago.
9. Discovering Ourselves, Strecker and Appel. The Macmillan Company, New York.
10. Social Work, A Family Builder, Harriet Townsend. W. B. Saunders Company, Philadelphia.
11. "People," Vol. 1, Number 1, Page 11. Birth Control and the Racial Future, Frank H. Hankins.
12. Mental Hygiene, Vol. XV, No. 1. The Approach to College Mental Hygiene, Kenneth E. Appel, Lauren H. Smith.

MULTIPLE MYELOMA*

CHAS D. CENTER, M. D.

THOS. J. MERAR, M. D.

QUINCY, ILL.

Multiple myeloma is a rare malignant disease[1] of the bone marrow; arising chiefly in the ribs, vertebrae and sternum—often exhibiting a widely diffuse osseous involvement. Cases have been reported with metastases to the spleen, kidneys, liver and lungs.

The condition is characterized by the growth of multiple tumors[2] derived from the hemopoietic cells of the bone marrow. The histopathological structure is more or less uniform, being composed of plasma cells or their derivatives.

Growths arise simultaneously in the bones envolved; encroaching on the cortex which becomes thin and eroded, allowing for the invasion to surrounding soft tissues.

Bence-Jones[1] in 1847 reported the presence of a peculiar protein in the urine of a case of osteomalacia, which has since been found to be present in a large percentage of cases of myeloma. The first case of this disease reported was that of McIntire in 1850 under the term mollities osseum, another case was reported by Weber in 1867. It was not until 1873 when Rustizky first recognized the bone marrow envolvement that it was termed multiple myeloma.

In 1889, Kähler[3] described a similar case and suggested that the protein might be diagnostic of multiple myeloma; as a result the condition has been referred to as "Kähler's disease." Wright reported a case in 1890, and Christian in 1907. By 1912, Wood had collected data on 50 cases which he increased to 100 cases in 1920.

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At present, Ewing has the recorded evidence of 140 cases. In 6,000 necropsies at Bellevue hospital of New York, Symmers[6] found 3 cases of multiple myeloma.

Multiple myeloma is essentially a disease of later life; approximately 80% of all cases occurring between the ages of 40 and 70 with the peak incidence at 55.[5] In this respect it closely follows the age incidence of metastatic carcinomatous skeletal tumors. Cases have been reported in children by Roman[6] and by Elizaldi[7] but they have been disputed by fellow investigators. As far as sex is concerned, the occurrence of myeloma in males, roughly estimated, is twice as frequent as in females. Anders and Boston, reporting 33 cases of myeloma, found 80% in males.

The disease has been reported in England, America, Germany and Italy. As a matter of fact, there is no locality to which the disease is limited, nor does it favor any climate or social strata.

As to the etiology of multiple myeloma there is little that can be definitely stated. Anemia, trauma and infection have been mentioned as causative agents.

In reviewing the clinical data of a number of cases previously reported, there appears to be several cardinal features which were found present singly or collectively in practically every case.

First, pain. This is the outstanding symptom and that which usually sends the patient to the physician. The patient describes what he believes to be a rheumatic or neuritic pain. It is wandering, intermittent, and transient; usually confined to the back; most often low lumbar or sacral. Many complain of pain over the ribs, sternum, legs, arms or shoulders, becoming aggravated by movement or pressure. There may be a period of intense pain, which lapses into a period of intermittency, an asymptomatic phase extending over a period of several months or a year. This phase in which the malady is apparently arrested is fairly characteristic of multiple myeloma, and was observed in the case I am about to report. During the final stages of the disease, the pain reaches a climax in which it is at a maximum severity with paresthesias and root pains, shooting, boring or stabbing in character, radiating peripherally to the nerve filaments.

Second, tumor. Often tumor formation is the initial sign that calls attention to the disease.[6] Multiplicity of the tumor is one of the outstanding features of this condition. Walgreen, Morax, Geschickter and Copeland have found only five cases with a single focus. These cases were admittedly not completely X-rayed. 85-95% of the cases show multiple involvement of the ribs, sternum, clavicle or spine. A lesser percentage in addition show invasion of the skull, pelvis and extremities. It is practically axiomatic to say that the disease is confined to the red bone marrow. As to size, the lesions vary in dimensions from that of a pin point to a walnut. It has been found that lesions near the surface are brought to the patient's attention by pulsation or tenderness. Pathological fracture may occur before its presence becomes apparent. As to the physical characteristics of the tumor itself, they have been described as elastic, yielding, pliable or malleable; red or gray in color according to their vascular growth. As the lesion encroaches on the cortex of the bone there may be produced a thinning and perforation, allowing the process to extend to surrounding tissues.

Third; fracture.[3] The bone destroying process of this disease is exemplified by the frequency of pathological fractures. There is no neoplastic disease in which fracture takes places so often as in multiple myeloma, occurring most frequently in ribs or clavicles. Bloodgood states that in other tumors of the bones, pathological fracture takes place almost exclusively in the long bones of the extremities, while in this disease the principal sites of fracture are the ribs, sternum or clavicles. The occurrence of several fractures in different bones is not unusual.

Fourth, deformity. Deformity of the bones, as a result of tumor formation and bone necrosis, is often only met with in the far advanced cases. The gradual degeneration of the vertebral body with collapse of the spine, especially in the thoracic and lumbar areas, is seen fairly often, and was a feature of our case. Scoliosis, kyphosis and flattening of the lumbar curve with telescoping of the vertebral bodies is described in the literature. Recently in our case we have

been able to detect annular enlargements of the long bones.

Fifth, kidney involvement. The changes in the kidney are neither constant nor uniform. Chronic nephritis with non-protein nitrogen retention and a low blood pressure is the usual occurrence in cases reported, although the blood chemistry and pressure in our case were insignificant.

We encountered a chronic nephritis with albumen ranging from XX to XXX, at all times, and a fairly consistent showing of Bence-Jones bodies. Every case reviewed mentioned nephritis of one grade or another, and nearly all mention Bence-Jones bodies; in fact many cases have been brought to light on the basis of this test. The presence of Bence-Jones bodies in the urine, has been variously reported from 60 to 80% of the cases. It is true, as we found in our own case, that they will appear and disappear at irregular intervals. Bence-Jones bodies are not, however, a specific clue to multiple myeloma, they may appear in any disease process of the red bone marrow. The test is made by heating the urine to approximately 60° c. A cloudy white precipitate appears, which will disappear at 90° c.-100° c., and again forms on cooling.

Sixth, blood picture.[5] Again we cannot make definite statements except to say that the majority of cases of multiple myeloma, will show a secondary anemia. Our case showed 50-65% hb., 2,680,000 to 3,340,000 r. b. c. and on one occasion for a short time, a leucopenia. The differential count was not significant, Geschickter found myelocytes and eosinophiles in abnormal numbers but ours were within normal limits.

Seventh, metastases. Pappenheim, Lubeck, H. Hirschfeld, V. Damarus, Eugene Fraenkel, quoted by Kaufman, are of the opinion that true metastases, per se, do not occur as in ordinary malignancies, but merely an expression of a systemic disease of the meopoietic system. On the other hand, Arnold, Hoffman, and Herxheimer have found what they believe to be spleen metastases.

Eighth, x-ray. The x-ray has done much in helping to clear up doubtful cases of this disease, and a complete study of the entire skeleton will often reveal lesions at wholly unsuspected sites. As said previously, the trunk, sternum, ribs and spine are the usual distribution.

The bone destroying lesions show up as irregularly rounded, punched out areas from ½ to ⅞ cm. in size, and when diffuse give a mottled appearance. In addition to the destructive process, it is quite common to see thickening and enlargements.

Metastatic carcinomatous bone lesions are not unlike the destructive process of multiple myeloma, and must be carefully ruled out.

Prognosis and Treatment: The outlook of this disease is, practically without exception, unfavorable, the course running from one to two years, occasionally three years. I have been unable to find a record of any treatment which has shortened the duration. Sulpharsphenamine has been recommended and was used in our case, without significant results. Several physicians reporting cases have mentioned the use of x-ray exposure and Coley's toxin without avail. The therapy is therefore mainly palliative and unsupportive.

Summary:

1. Multiple myeloma is a rare malignant disease of the bone marrow.

2. Sites of pathology are mainly in ribs, sternum and vertebrae.

Diagnosis based on:

Pain, tumor, fracture, x-ray, biopsy, kidney involvement and B. J. bodies.

REPORT OF CASE

O. M., white, intelligent active business man, aged 70 years, gives following history.

Three years ago he consulted one of us (C. D. C.) who made a diagnosis of pyelitis, which cleared up under the usual therapy. January, 1930, he was treated for a supposed pleurisy while in New York City, and left for home against his physician's advice. Twenty days later he appeared at the office seeking relief from pain in his chest, which was accomplished to a considerable extent by strapping with adhesive. The following March while attending to his business, he stubbed his toe on an inequality of the pavement and immediately felt a sharp sticking pain in his right chest. At the same time he complained of low lumbar pain which was so severe that on being moved the patient would cry out with pain.

The past history is negative except for hemorrhoidectomy and unilateral orchidectomy, in his youth. The systemic history is practically negative. Physical examination revealed a tall well developed anemic appearing white male, complaining of pain in right chest and over lumbar sacral spine. Beyond the usual arteriosclerotic changes evident in a man of 70 years, the

only positive findings were tenderness and diminution of motion over painful areas.

B.P. 120/80	No abnormal cells present.	
Blood Examination.		
R.B.C.	3,340,000	2,680,000
H.B.	65	52
C.I.	1	1
W.B.C.	7,650	4,750
Staph.	3	0
Segm.	62	41
Polys.	65	41
Lymphs	32	57
Myel.	0	0

Blood sugar—90 MG.
Non-protein nitrogen—33 MG.
Uric acid—2 MG.
Blood cal.—7 MG.

Urinalysis:

Acid—1008—Alb. xx	Indican— x	W.B.C. xxx	B.J. —
Acid—1004—Alb. xx	Indican— —	W.B.C xxx	B.J. x
Acid—1010—Alb. x	Indican— —	W.B.C. xxx	B.J. x
Acid—1010—Alb. xxx	Indican— —	W.B.C. xxx	B.J. —
Acid—1012—Alb. xxx	Indican— —	W.B.C. xxx	B.J. +

Diagnosis: Multiple myeloma, chronic nephritis, chronic myocarditis.

X-ray report: Partial collapse of the body of the 12th vertebra with a suggestion of a beginning similar process in 11th thoracic body. The intervertebral spaces in this situation appear normal. There is a slight scoliosis of lower thoracic spine with the convexity directed to the left. The entire vertebral column shows a rarefaction of the bones. (Minute small areas of rarefaction.) These small areas of rarefaction are also noted in the ribs and pelvis.

Long bones: In the medullary canal of the fibula and radius, there are a few small areas of rarefaction.

Conclusion: The impression one secures is, that this osseous change is due to multiple myeloma, or a metastastic carcinoma.

October 8, 1930. Examination was made of the skull, thoracic and lumbar spine, chest, pelvis, legs and forearms. The same condition previously described is seen, there being but little change. The condition in the spine appears somewhat more marked.

Therapy: Luminal; Calcium lactate; Viosterol; Liver-extract; Ultra-violet; Sulpharsphenamine; Distilled-water.

BIBLIOGRAPHY

1. Ewing, J.: Neoplastic Diseases, 3rd Edition.
2. Vance: Am. Jr. Sc. Med. 152: 593. 1916.
3. Mewburn and Vanso: Can. Med. Jr. 1924. Vol. xv, 502: 509.
4. Geschickter, C. F.: Annuals of Surg. Vol. xcii, No. 3, p. 425. Sept., 1930.
5. Geschickter and Copeland: Arch. Surg. 1928. Vol. xvi. 807: 863.
6. Roman: Beitr.-Z. Path. Anat. Vol. 52, p. 385.
7. De Elizalde and Lambias: Rev. Socy. Med. Argent. Vol. 21.
8. McMahon, Alphonse: Med. Clin. N. A. Philo. 1926. Vol. ix. 243: 262.

DISCUSSION

Dr. J. P. Simonds, Chicago: The diagnostic value of the presence of Bence-Jones protein in the urine is well recognized, but not finding this substance in the urine does not exclude the diagnosis of multiple myeloma. On the other hand, its presence does not in itself alone make the diagnosis because it is found occasionally in the urine in other diseases, such as widespread carcinomatosis with metastases in bone.

Dr. Wells has called particular attention to the fact that necrosis in these localized myelomatous areas in bone may be the source of origin of some of the bone cysts ordinarily shown on x-ray examination.

I would like also to call your attention to the fact that these cases not infrequently have a medico-legal significance. I noted in the history of this case reported by Dr. Merar that after stumbling the man suffered severe pain in the chest. Two of the cases of multiple myeloma which I have seen were made the subject of industrial claims. One was a porter on a Pullman car who claimed to have hurt himself as the car lurched, wrenching his back in the region of the sacrum. We found at postmortem examination a very extensive growth of myelomatous tumor which may, as a result of the accident, have broken through the bone and invaded the sacro-iliac synchondrosis. The other was the case of a woman who was on the street car; when it suddenly started or stopped her head was thrown back and she began to have severe pain in the region of the seventh cervical vertebra. The same sort of thing occurred in that case, the growth broke through the shell of bone into the spinal canal and produced a paralysis as a result of pressure on the spinal cord resulting in death. So sometimes the first symptom of this condition may be one that is due to an alleged accident and may have an industrial or medico-legal significance.

Dr. T. J. Merar (Closing): I would like to mention that this patient is bedridden, and every two or three weeks he suffers a pathologic fracture of a rib while lying quietly in bed. We frequently get a call informing us that the patient is suffering with severe pain. On examination we find crepitation and evidence of rib fracture. The urine clears up for a few days and then shows marked albuminuria. The patient is making a downward course and is becoming weaker all the time.

EARLY RECOGNITION OF GAS BACILLUS INFECTION BY X-RAY*

HARRY OLIN, M. D.
Director of X-Ray Department, Woodlawn Hospital
CHICAGO

It is well recognized that crushing wounds such as occur in trolley car, street railroad, automobile and industrial accidents are sometimes complicated by gas bacillus infection. The late World War, fought under conditions wherein large masses of troops were exposed to constant shell and machine gun fire in a soil rich with gas bacillus, tetanus and other allied organisms,

*Read before the Section on Radiology of the Illinois State Medical Society, May 6, 1931, at East St. Louis.

caused in soldiers many wounds complicated by gas bacillus infection. These two sources of infection are so well known as to merit little comment. But the exceptional case at times requires constant alertness on the part of the physician treating a supposedly common injury —in the instance of the first case, a fall from a wooden bench causing a compound fracture and complicated by gas bacillus infection. In civilian life such injuries from falls are common but a complication as gas gangrene developing in the wound is comparatively an infrequent and unusual sequence. Because of the rarity of this complication under these conditions and the grave danger to loss of limb or even life, these cases are reported with the hope that it will stimulate sufficient interest to recognize the complication early. A correct diagnosis in the first twenty-four hours may save a limb—if made later, loss of the limb inevitably occurs, through gas gangrene, or death may follow from septicemia or gas embolism.

The offending organism usually present in most cases is the bacillus aerogenes capsulatus although other bacteria have been found accompanying the process. The consensus of opinion seems, however, to indicate that the Bacillus aerogenes capsulatus occupies the leading role and the other bacteria may or may not play a part in the process. The infection is apparently more virulent and rapid when associated with active streptococci or other pus producing organisms. Many writers contend that the infection is a mixed one as demonstrated clinically, anatomically and pathologically with the Bacillus aerogenes capsulatus occupying the leading role; various other bacteria have been described as able to produce gas as the Bacillus proteus vulgaris, the Bacterium pseudo-oedematis maligni and the Colon bacillus, the latter becoming most potent in the presence of diabetes.

Definition. Because many terms and names have been applied to this infection, it seems advisable to enumerate all the more common ones and to define the condition. The nomenclature, according to Freeman[1] in Keen's Surgery is confusing and includes a variety of names, some of which are gaseous gangrene, molecular gangrene, traumatic emphysema, acute putrid infection, acute gangrenous septicemia, spreading traumatic gangrene, emphysematous gangrene, acute gangrenous edema, serous gangrenous infiltration, primary mephitic gangrene, progressive gangrenous emphysema, gas plegmon, acute microbic gangrene, fulminating gangrene, gangrenous cellulitis, malignant edema, anaerobic gangrene, gangrene foudroyante and gas bacillus infection.

It may be defined as a serious infectious disease characterized by a local, widespread, serous and emphysematous inflammation, frequently associated with gangrene and general symptoms of a profound toxemia.[8]

Mechanism of Infection. Infection may occur through wounds in any part of the body or gain access through any body cavity. Hematogenous infection sometimes does occur and may be carried to distant parts of the body as a case of gangrene of the vulva wherein extensive secondary involvement of the subcutaneous tissues of the left shoulder occurred without any lesion of the skin.[1] Gas gangrene of the abdominal wall following gangrenous appendicitis has been reported[2] and H. Von Seemen has reported infection of the thorax following a stab wound of the heart.[3] It is well to bear in mind, however, that occasionally the infection may become latent and, if unrecognized, give rise to serious complications or even death. It not infrequently follows gangrene of the lower extremity resulting from impaired circulation whether the gangrene is dry or moist or the skin intact or broken. In the summary of six reported cases by Linton, of latent gas bacillus infection complicating gangrene of the lower extremity, three were diagnosed as arteriosclerotic, two as diabetic and one following thrombo-angitis obliterans. All six cases had amputations of which three died, one death due to gas bacillus septicemia in twenty hours.[4] Linton makes the following statement, "The duration of the gangrene varied in these cases from ten days to three months prior to admission to the hospital. Thus the duration of the process does not aid a great deal in the detection of the gas bacillus infection, except that in cases of several weeks' duration, it should certainly be strongly suspected."[4]

Crushing wounds of the extremities are often followed by gas gangrene, the bacteria growing rapidly in the necrotic tissues and spreading along the muscle bundles. The gas formed in

the dead tissues causes further destruction by complete stoppage of the capillary circulation or by gas emboli and is retained by the fascial planes of the muscles.[8] If death ensues, a liver riddled with small holes containing gas bubbles is found—the characteristic appearance of "foamy liver."

History. Gas gangrene was not unknown in the early medical history. In the sixteenth century Ambrosé recognized it. The Spanish-American and Civil Wars had a considerable number of cases complicated by gas bacillus infection, the bacteriology of which was either unknown or little understood. In the Spanish-American War no mention is made of detection of gas bacillus infection by use of the Roentgen ray. A perusal of one of the first medical books of the Spanish-American War, published under the direction of Surgeon General Geo. M. Sternberg by the Medical Department of the Army, fails to reveal any mention of the use of the Roentgen ray in this condition.

Bacteriology. Welch and Nuttall, in 1891-2, first described the Bacillus aerogenes capsulatus. Frankel gave it the name of Bacillus phlegmonis. The term Bacillus perfrigens was used by the French. During the World War it was the most common cause of gas gangrene (75%) although nearly always associated with other organisms, especially the Bacillus sporogenes and certain aerobes. Apparently only certain very virulent strains can produce gas gangrene and only in the presence of necrotized tissue in the wound. It is because of the latter factor that thorough excision of injured and crushed tissues was advocated and made an universal policy in the treatment of these wounds—the so-called "dé bridement" of the French.[7]

A noted French worker regards the Vibrion septique and the Bacillus perfrigens as the causative factors in gas bacillus infection,[5] although other organisms play a secondary part. The symptoms and appearance of gas gangrene varies according to the virulence and predominance of the organisms present at the time of injury. Some cases show gas without gangrene and some gangrene without gas. When emphysema develops in the tissues it usually spreads with alarming rapidity although the process of gas formation may be held in check due to the latency or temporary inactivity of the bacteria. The period of incubation varies; in the graver forms infection begins twenty-four to twenty-eight hours after the wound, while the slow form usually begins on the fourth day. The latency of infections occurring in gangrene of the lower extremities has been already stated.

In truth many organisms have been described as able to produce gas gangrene. In order of their importance can be cited the following: 1. Bacillus aerogenes capsulatus (Bacillus Welchii) called perfrigens by the French; 2. Vibrion septique, thought to be identical with the Bacillus of malignant oedema; 3. Bacillus of malignant edema; 4. Bacillus sporogenes; 5. Bacillus fallax; 6. Bacillus histolyticus; other organisms have been mentioned as the Bacillus pyocyaneus, the Bacillus proteus vulgaris and the colon bacillus, the latter being the most formidable in the presence of diabetes. The combination of the Bacillus Welchii with one or more of these bacteria, working by symbiosis in conjunction with the aerobic germs such as the streptococcus, furnish the most virulent types of gangrene. Dust, soil and feces are the media which form the habitat of the Bacillus aerogenes capsulatus and its group of allied bacteria. Gage has even found gas bacillus not only in the wool pads of bullets, but was able to grow them in cultures taken from woolen clothes after having been pressed and in samples of unused cloth taken from a neighboring tailoring establishment.[9] It is believed that two distinct toxins are produced—one hemolytic, causing diffuse staining of tissues and the other toxic.

The Bacillus Welchii is a large rod, often encapsulated, and on certain media is spore bearing. It is anaerobic in character, grows readily in a variety of cultures, thriving best in litmus milk under aerobic conditions; coagulation soon follows and the coagulum is thrown into shreds, colored pink by acid formation, plastered against the sides of the tube. In clear whey are found masses of gas riddled coagulum floating on the surface, emitting an odor of butyric acid. Cultures should be examined at intervals of six, twelve, eighteen and twenty-four hours to detect at the earliest period the formation of gas as noted by bubbles in the media.

The Relation of the Welch Bacillus to Appendicitis and Its Complications. Jennings, with an experience of ten years with appendicitis and

its complications in relation to the Welch bacillus, regards the clinical picture as sufficiently diagnostic or suspicious when present to administer the gas serum in large doses. His routine consists of 100 cc. of the gas serum in 1,000 cc. of normal saline, given subcutaneously to avoid the usually severe reaction from the intravenous route; followed by 200 cc. daily for two or three days if the patient still has evidence of gas infection—rapid pulse with cyanosis, and if the organism is present in the peritoneal fluid.

He believes that with gangrenous changes in the appendix, appendiceal abscess, localized peritonitis or free peritoneal exudate or changes in the neighboring gut—usually terminal ileum—that the activity of the Bacillus Welchii is cut short by removal of the appendix. However, this is not always the case and he believes it to be a most active factor in the production of fatality. His dose in some cases has been as high as 1,000 cc. of gas serum.[19]

War and Civilian Infection. Among the wounded evacuated to the hospitals of the interior of France from March 21, 1916, to the end of the war, 1,851 cases of gas gangrene were recorded of which number 615 were fatal, a mortality of 33%. The number of fatal cases observed in the hospitals of the rear, reported according to the anatomical regions wounded were as follows:[10]

Regions	Cases	Deaths	Proportion of Deaths per 100 cases
(1) Head, neck, chest, thorax, abdomen, genital organs....	67	36	53.73
(2) Upper limbs including soft parts and skeleton.....	415	123	29.63
(3) Lower limbs including soft parts and skeleton.....	1267	455	35.91

On the other hand, in civilian life it is interesting to note the experience of several who have treated this infection. Tenophyr had a mortality of 29% in twenty-four cases; seven of the surviving had amputations and 42% recovered without amputation.[11] From 1922 to 1929 at the Grady Municipal Hospital at Atlanta, in a series of eighty compound fractures occurring in negroes, fifteen developed gas gangrene, a percentage of nineteen. Five other cases were recorded which were not compound fractures, one a diabetic gangrene. During the same period of ninety-seven cases of compound fractures in whites, seven developed gas gangrene, a percentage of about seven. In both classes the nature of the compound fracture was equally severe and Boland is of the opinion that the uncleanliness of the negro undoubtedly increases his susceptibility to the infection.[12]

Clinical Course. To begin with, any type of wound may harbor a gas bacillus infection, whether superficial or deep, although sealed, deep wounds offer the most virulent type. Since the organism is anaerobic, wounds of any depth sealed against the air wherein interference with oxidation and blood supply occur, offer the ideal media for certain infection. Impairment of blood supply usually follows destruction of tissue, accompanied by edema or by tight splinting or packing of wounds, prolonged application of a tourniquet, excessive hemorrhage, shock and cold. Virulent infections are characterized by a rapid course, death often ensuing in a few hours after onset of definite symptoms. Symptoms in the average case, however, appear on the second or third day following the injury. Severe pain in the wound, rapid pulse all out of proportion to the temperature, fever, restlessness and an acute intelligence maintained to the end form a symptomatology which should make one suspicious of this infection.[13]

It is imperative to recognize this deadly infection early if loss of limb and life are to be avoided. Three very suggestive symptoms appear early, first pain which is all out of proportion to the amount of injury; secondly the obnoxious, foul, penetrating, fecal odor which is characteristic of the infection and thirdly, a greatly increased pulse which is disproportionate to the temperature curve; acuteness of intellect may be added to this syndrome to complete the picture; at the end of twenty-four hours there is usually a dirty greenish gray membrane over the wound. If the wound has been sewed, the edges will be red and bronzing of the skin in the affected area is seen if examined in good light. The dressing will be stained with a reddish brown serum of a foul odor likened to the smell of a mouse and Bacillus Welchii are found in the discharge but no pus is evident; bronzing of the skin usually precedes the crepitation which occurs when the tissues are infiltrated with gas and gangrene supervenes. Preferably before this stage has developed, a roentgenogram should be made; black areas or spots on the plate at the

site of fracture or in the neighboring soft tissues reveal the presence of gas long before there is crepitation felt in the tissues and when there is only beginning invasion of the muscle. Since gas is formed in six hours, as shown by stab cultures in anaerobic media, it is strongly recommended that roentgenograms be made every six hours to detect the first appearance of gas in the tissues.[4] Later the limb becomes swollen and edematous and the skin covered with irregular patches of copper colored areas, some containing blebs, crepitation of the tissues is readily elicited, constitutional disturbances, fever, greatly accelerated pulse, perhaps beginning delirium, all may accompany the local manifestations of beginning gangrene and death may follow through septicemia or gas embolism. Great variations in the clinical picture may occur and doubtful cases must be carefully watched until the diagnosis is confirmed or excluded; relatively benign cases may assume a very virulent course.[15] As in any infection, leukocytosis is present but may be absent in the early stages or later in the disease. The white count in one of the cases reported never exceeded 15,700.

Roentgen Ray Findings. In the first twenty four hours the roentgenogram will detect the presence of free gas in the tissues. A small, black spot, blotchy in outline, is the first evidence and if carefully visualized can be followed along the course of a muscle. Longitudinal shadows are the rule, since the infection travels along the muscle fibre and rarely transversely. The limb should be bare and dry, all splints and dressings removed to insure no confusion of shadows contaminating the film. Loss of tissue and injections with antiseptics should be considered as these two factors may simulate gas in the tissues. The shadows of the soft parts present round or oval spots, some isolated and some confluent, forming hollow spaces which appear dark on negatives and light on positives. The gas spots can be compared to holes in certain cheeses which, indeed, are due to an analogous cause.[16] With the process advancing the soft tissues are invaded with irregular, blotchy areas of gas infiltrating the muscles and fascia and even obscuring the bone structure. The normal detail of the part is lost and the infection has now become widely disseminated and gangrene is certain to follow.

TREATMENT

When the infection is seen late with gangrene developing, amputation is not advised. The consensus of surgical opinion of those experienced in its treatment is that the mixed gas bacillus serum is to be given in heroic doses, preferably by the intravenous route, in amounts of 100 cc, and repeated. If 200 cc. do not control the infection it seems a better policy to continue treatment by intramuscular injections and to use from 300 to 400 cc. additionally. Some recommend a total of 500 cc. In one of the cases reported 580 cc. of gas bacillus serum was given intramuscularly with 1500 units of antitetanic serum. Sero-therapy is the most practical mode and the most efficacious for the protection against and treatment of gaseous gangrene. For the preparation of a polyvalent serum, one worker has used twenty strains of species of microbes including the Bacillus perfrigens, Vibrion septique, Bacillus edematiens, etc.[10]

The consensus of surgical opinion favors early and frequent inspection of crushing wounds with thorough excision of crushed, mutilated and necrotic tissues. All foreign bodies should be removed in so far as is possible. As a rule the treatment is nothing more than a repetition of the French measure of "debridement" carried out during the war.

Because infection spreads along the muscle sheaths, removal of a muscle group, as advocated by Kellogg Speed, saves amputation. He excises the entire muscle including its origin and insertion and leaves the wound wide open. Many surgeons believe this type of surgery, combined with vigorous antigangrenous serum administered intravenously and early in the disease, would obviate amputation and reamputation, the course of which is common in many cases.

In the proceedings of the New York Surgical Society, Dr. Robert H. Kennedy presented a case of a man 24 years of age, who on December 17, 1924, when 19 years old, was struck on the right leg by cardboard weighing 100 pounds. Admitted to hospital with the compound fracture of tibia and fibula with another closed fracture of fibula. Under general anesthesia debridement was done thoroughly, fracture reduced manually, wound closed, plaster splint applied. Gas bacillus infection developed in 24 hours. Confirmed bacteriologically. Wound immediately opened and Carrel-Dakin treatment carried out. Four hundred c.c. of tetanus perfringens was given intravenously. At the fifth day there was no evidence of gas bacillus infection. No amputation. Dis-

charged on 132nd day with wound healed, solid union, complete motion in knee joint, no active motion in ankle joint. Patient made uneventful recovery except for abscess of os calsis due to Steinman pin. Abscess opened, treated, made uneventful recovery.

Another case reported, man aged 37, porter, admitted to hospital February 20, 1924, crushed injury of right leg, sustaining compound fracture of both bones, wound debrided. Fragment of tibia, 2 inches long, removed, wound left open, Carrel-Dakin treatment instituted, and plaster splints applied. Three days later gas bacillus infection occurred, leg reopened from 2 inches below malleous. Four hundred c.c. of tetanus perfringens intravenously in 24 hours. Infection promptly controlled and by 18th day wound was fairly clean and commenced to be covered with epithelium. Discharged 107th day with union, no shortening, no deformity, and complete function of knee and ankle, although leg is smaller than that of the opposite side.

In discussion Dr. Kennedy mentioned that tetanus perfringens serum had been used in at least 25 gas bacillus cases, always accompanied by thorough surgical procedure; gives no ill effects from serum. Sometimes used as a prophylactic in cases in which there was possibility of gas development. Actually scrubbed wounds in debridement and saw no ill effects. In wounds which were dirty from being dragged in streets or ground around in bottom of an elevator shaft and where there was no muscle injury, effort was made to get out dirt, clean out muscle. If muscle actually was dead, it was excised; greatest dependence was placed on thorough washing, irrigating with up to 3 to 5 gallons of fluid.[15]

As a prophylactic 30 to 60 cc. of polyvalent anti-gangrenous serum (Lederle) is recommended combined with 1,500 units of antitetanic serum injected intramuscularly.* Most workers favor continuous irrigation with Carrel-Dakin's solution if it can be carried out religiously, otherwise daily potassium permanganate irrigations are in order. All wounds should be packed lightly with wet gauze. Of course it is needless to remark that supportive measures should be instituted to aid in combatting the infection.

SUMMARY

I can do no better than to repeat a list of conclusions which I summarized in a previous communication.[17]

1. Gas bacillus infection is a serious menace to life and limb.

2. All crushing injuries, gunshot wounds and compound fractures should have considered the possibility of this complication.

3. Early diagnosis is imperative, therefore early x-ray examination without dressing and splints with a repetition, if necessary, every six hours.

4. Inspection of all infected wounds twice daily; make smears and cultures for gas bacillus.

5. Early surgical attention — debridement and all it implies.

6. Intensive polyvalent anti-gangrenous serum treatment intravenously with supportive measures.

7. Continuous irrigation, preferably Carrel-Dakin's method, or, if that is impossible, potassium permanganate.

I might add, if I may, another suggestion to which reference is made in my paper, that is combined antitetanic and antigangrenous serum of 30 to 60 cc. as a prophylactic measure. I am greatly indebted to Drs. Mathew Everetz, Chas. H. Miller and Fred W. Moeller for their kind suggestions and the privilege of reporting these cases.

BIBLIOGRAPHY

1. Freeman, Leonard: Keen's Surgery; 1, 340.

2. Shearer, J. P.: Gas Gangrene of Abdominal Wall Following Gangrenous Appendicitis; American Surgery; 90, 6, 1114-1117, December, 1929.

3. Seemen, H. von; Stab Wound of Heart Followed by Gas Bacillus Infection of Thorax; Deutsche Ztschr. f.; Chee 215, 321-326, 1929.

4. Linton, Robert R.; Gas Bacillus Infection Complicating Gangrene of the Lower Extremity; Journal, A. M. A.; July 19, 1930.

5. Guermorprez, F. R., Professeur de Medicin Major: Gangrene Gazeuse Pendant la Guerre de 1914-1916; Tomes 1-14, Paris J. Russet, 1916.

6. Borden, Capt. W. C., U. S. Army; The Use of the Roentgen Ray by Medical Department U. S. Army in the War with Spain; 1900.

7. Stitt, E. R.: Practical Bacteriology, Blood Work, etc.; 6, 24-25 (1927 edition).

8. Delafield and Prudden; Pathology; 321.

9. Gage, I. M.; Gas Bacillus Infections; The Amer. Jour. of Surg., 1, 4, 177-184.

10. Vincent, H.: Prophylaxis and Treatment of Gaseous Gangrene by Specific Sero-Therapy (Polyvalent Anti-Gangrenous Serum); International Clinics; 4, 138-142, December, 1925.

11. Tenophyr, Joseph; The Treatment of Aerogenes Capsulatus (or Gas Bacillus) Infection in Civil Life; New York State Jour. of Med.; 27, 16-18, January 1, 1927.

12. Boland, F. K.; Gas Gangrene in Compound Fractures; Amer. Surg.; 90, 603-613, October, 1929.

13. Miller; Blanche B.; Gas Gangrene—A Summary; West Virginia Med. Jour.; 23, 303-304, June, 1927.

14. Sprague, Capt. Fred A., M. Corps, U. S. Army; Gas

*Since this is written a new combined serum has appeared in the market containing anti-gangrenous and anti-tetanic serum. Those whose experience is rich in this condition recommend and advocate this combined serum in all crushing wounds and compound fractures as well as a prophylactic measure. Certainly the serum treatment has been used, either not at all or in very small, insignificant doses. Any therapeutic measure to be effective, especially where a life is at stake, demands vigorous measures and adequate dosage pushed to the fullest possible physiological and clinical limits, to insure effective results.

Gangrene of the Leg Due to B. Welchii, Report of Case Diagnosed Roentgenologically; Amer. Jour. of Roentgenology; 6, 145, February, 1919.

15. Quervain, F. de: Gas Gangrene, Latent Infection by Gas-Forming Bacilli; Schweiz. Med. Wchnschr.; 59, 397-398, April 13, 1929.

16. Schwartz, Gottwald: Roentgen Demonstrations of Gas Phlegmon; Wien. klin. Wchschr.; January 28, 1915.

17. Olin, Harry; Gas Bacillus Infection; Woodlawn Hospital Clinical Quarterly; 1, 1, 28-38.

18. Kennedy, Robert H.; Trans. N. Y. Surg. Soc. An. of Surg., Vol. XCIII, February, 1931. Pp. 619-620.

19. Jennings, John E.: The Relation of the Welch Bacillus to Appendicitis and Its Complications; Ann. of Surg., April, 1931, Vol. XCIII, Pp. 828-836.

Case 1. Attending physicians and surgeons—Mathew Evertz, Charles H. Miller, Fred W. Moeller.

Barbara A. (Case No. 9274), 4½ years old, admitted to the hospital August 7, 1930, 1:30 p. m. August 6, 1930, 4:30 p. m., fell from bench in garden recently sodded with rich black dirt, sustaining a compound fracture of the ulna. Mother applied cold bandages to check hemorrhages and drove five miles to city to physician; the patient was later taken fifty miles to Chicago and consulted own physician at 9:00 a. m. August 7. Temp. 100.3, pulse 110. Splint on left forearm was removed and punctured wound found which was painted with mercurochrome; wound at this time appeared clean. A splint was reapplied and child put to bed. At 1:00 p. m. the same day the doctor was called and found child in convulsions; admitted to hospital immediately. Temp. 103.2, pulse 145. After enema and warm bath temperature fell to 100.3; child had received narcotic before admission.

Physical examination. Well nourished, healthy-looking child. Examination essentially negative save for left forearm—punctured wound junction of upper and middle thirds left forearm covered with sterile dressing; bone crepitus readily made out. Diagnosis of compound fracture ulna junction of upper and middle thirds left forearm. Warm bath and enema had no effect on convulsions so child received 1/15 of combination tablet of hyocyine, morphine and cactein; then was taken to x-ray at 2:30 p. m., August 7.

Following morning left forearm was again x-rayed with all splints and dressings removed. The fracture was then reduced under fluoroscopic guidance; while child was on fluoroscopic table fecal odor was observed and it was thought that child had a bowel movement. Reports of x-ray will be given under separate heading. With forearm in splint and limb bandaged, child was returned to room. At 1:15 p. m., hand and fingers appeared cyanotic so splint was again opened and cyanosis disappeared. At 6:00 p. m. cyanosis of fingers was again observed and all splints and dressings removed. At this time hand and forearm were swollen and edematous; skin showed irregular patches of a dusky reddish-blue color and was insensitive to pinpricks; a thin watery brown color discharge, very foul in odor, exuded from the wound. A diagnosis of gas bacillus infection was made and mixed gas bacillus serum administered.

Laboratory Findings: 1. Blood at time of entrance —White blood count 7250; Differential; polymorphonuclears 70%, lymphocytes 30%. Urine negative.

Bacteriology: Exudate from wound, smear Gram stain—Gram positive encapsulated bacilli, some showing spore formation, bacilli very large, very few other organisms, no pus cells seen. Conclusion—B. aerogenes capsulatus.

X-Ray Findings: 1. Roentgenogram, 8/7/30 2:30 p. m. Radiographs, taken through a perforated metal splint, reveal a comminuted fracture of the ulna at the

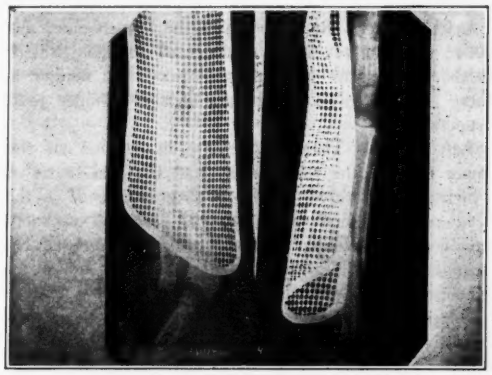


Fig. 1. Gas Bacillus infection 22 hours after injury; arrow points to beginning invasion of tissues with gas at site of fracture of ulna. No crepitus of soft tissues present at this time.

junction of the upper and middle third with internolateral and posterior displacement of the proximal fragment. In the soft tissues at the proximal end of

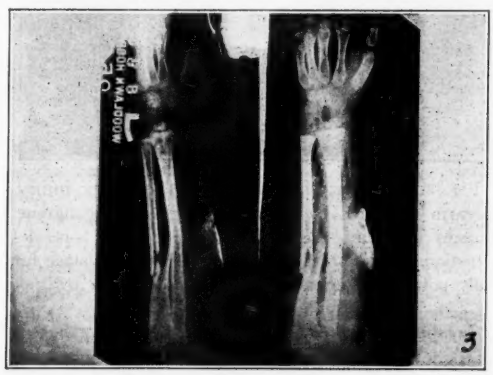


Fig. 2. Gas Bacillus infection 42 hours after injury. Note widespread dissemination of gas in muscles and fascia, extending into palm and to elbow. Extensive crepitus of soft tissues, forearm swollen and edematous.

the distal fragment of the ulna is seen a small area of decreased density (a black spot) which follows along the shaft for a distance of one-half inch. (Fig. 1).

2. Roentgenogram, 8/8/30, a. m. Re-examination the following day with the splint and dressing removed

shows, throughout the entire forearm and extending into the palm, irregular blotchy areas of decreased density (irregular black spots) which follow along the course of the fascia and muscles. The tissues of the forearm and hand are markedly thickened throughout. A fluoroscopic examination was made for reduction of the fracture.

Summary: Compound fracture of ulna associated with gas bacillus infection. (Fig. 2).

3. Roentgenogram, 8/26/30. Clinical diagnosis: Post pathological amputation of lower two-thirds of forearm following gas bacillus gangrene.

Left shoulder: Radiographs of the left shoulder and entire humerus reveal no evidence of any gas present in the soft tissues or changes in the bone; neither is there any evidence of pathology in the shoulder joint proper.

Left elbow: There is definite destruction of the upper ends of the radius and ulna, the periosteum of which is proliferated. The cortex at both ends of the bones appears moth eaten in character and probably involves the articular surface of both stumps. No changes are visible, however, in the lower end of the humerus.

Summary: Infectious arthritis elbow joint; osteomyelitis of stumps of radius and ulna following gas bacillus gangrene. (Fig. 3).

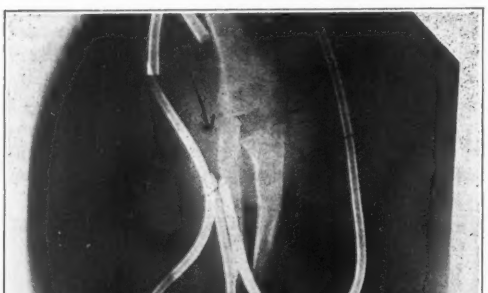


Fig. 3. Gas Bacillus infection 19 days after injury, forearm separated by sloughing due to gas gangrene. Stumps of radius and ulna remaining show bone destruction, necessitating removal. Catheters in place for daily potassium permanganate irrigations.

Treatment: 1. Anerobic antitoxin for gas gangrene (Lederle), serum containing antitoxin of tetanus, perfringens, vibrion septique and B. histolyticus.

Aug. 7, 1500 units antitetanic serum.
Aug. 8, 100 cc. anerobic antitoxin.
Aug. 9, 100 cc. anerobic antitoxin.
Aug. 10, 130 cc. anerobic antitoxin.
Aug. 11, 50 cc. anerobic antitoxin.
Aug. 12, 50 cc. anerobic antitoxin.
Aug. 13, 50 cc. anerobic antitoxin.
Aug. 14, 25 cc. anerobic antitoxin.
Aug. 15, 50 cc. anerobic antitoxin.
Aug. 16, 25 cc. anerobic antitoxin.
Total—580 cc.

Progress: The child still continued to run a temperature, forearm became black and finally gangrenous, characteristic foul, fecal stench from arm and wound. August 17, rectal anesthesia (avertin) narcotic and dead tissue separated at line of demarcation, bone cut one inch above line and two rubber catheters inserted. Irrigation with potassium permanganate solution was done every three hours; irrigation carried out daily.

August 26 roentgenogram of stump of forearm (see report).

August 27, under rectal anesthesia (avertin) disarticulation of elbow joint; one cigarette drain and two gauze drains inserted in stump. Smear from discharge still showed presence of gas bacilli (B. aerogenes capsulatus).

Child sustained a serum reaction which lasted several days. On September 1, temperature fell to normal and granulations looked clean and healthy. On September 7, wound practically healed, slight serous discharge, temperature normal since September 1. Discharged from hospital.

Pathological report of bones removed: Fragments of radius and ulna. Mx: The periosteum is markedly edematous and vacuolated in places; the blood vessels are surrounded by collections of round cells; the collagenous fibres are somewhat hyalinised; a few cellular collections are seen at the edges of the periosteum; a club-shaped swelling of the periosteum was seen, containing a central necrosis and large amounts of polymorphs and cytoplastic cells; the bone structures are partially destroyed by invading polymorphs and round cells; the bone marrow shows typical inflammatory changes.

Diagnosis: Chronic, purulent periostitis; subsequent osteomyelitis.

Case 2. No. 10531—P. McM. Admission Woodlawn Hospital December 16, 1930.

Occupation—Secretary.

History obtained from nurse and sister.

On November 16, 1930:

1. Crushed between two street cars—both legs and knees.

2. Gas Bacillus infection and amputation of right leg at knee.

3. Foci infection both shoulders—secondary.

Conscious when help arrived but later recalled nothing about accident. Both legs crushed at knees. Taken directly to another Hospital—legs set and bandaged. Dr. Moeller called on case four days later at patient's request.

Right leg was infected and gas bacillus and turned black two days after accident. Total of 400 c. c. of serum (anerobic) at intervals of 8 hours. On admission, 100 c. c. serum (gas bacillus—Lederle) intravenously; 50 c. c. subcutaneously. Every 8 hours, 50 c. c. given until total dosage reached 400 c. c. Following each injection a slight serum reaction occurred, with nausea, anorexia and slight mental disturbance. No chills or urticaria. Due to lack of nourishment and toxemia, grew steadily weaker and pulse reached 160.

Serum treatments stopped and 3 blood transfusions were given at intervals with good results. Appetite returned and patient gained strength rapidly. About November 30 right leg was amputated just above knee, under ethylene anesthesia. Condition of patient was poor during operation, but rallied with a blood transfusion. Later a fifth transfusion was given. Developed secondary involvement of both shoulders; left was aspirated and 10 c. c. of yellow pus was obtained (thought to be staphylococcus aureus). Red blood count varied from two to three million. Each transfusion caused a marked increase in red count. White blood count varied from fifteen to twenty thousand during illness.

Beginning Thanksgiving day the patient became very irrational and at times delirious and was kept in bed with difficulty. Past two weeks (Dec. 16, 1930) had lapses of memory with brief periods of irrationality, but mind clear greater part of time.

December 16, 1930—Physical examination.

Entrance: T. 99.4; P. 128; R. 22.

Poorly nourished male.

Head—Pupils equal and regular, react to light and distance. Mouth—Tongue coated, teeth fair, post pharynx injected. Nose and ears negative.

Neck—Thyroid negative.

Chest—Lungs, expansion limited on both sides. Many scattered rales over both lungs. Breath sounds rough. Resonance O. K.

Heart—Slight enlargement to left, first tone at apex is rough. Tones are all distant. Rate 128.

Abdomen—Negative.

Extremities—Recent amputation of right leg above knee. Wound is draining and skin flap does not cover surface of wounds. There is a denuded area over left leg below popliteal space draining pus. Left leg much lateral motion.

Impression—1. Recent gas bacillus infection. 2. Injury to lateral ligament of left knee. 3. Myocarditis.

Blood—December 16, 1930. W. B. C., 11,200; R. B. C., 4,170,000; Hb., 70.

Differential: Polys. 86, Eosin. 1, Small Lymphs. 12; Large Mono. 1, count 200 cells.

Date	R.B.C.	W.B.C.	Hb.	Polys.	Poly. Baso.	Eosin.	Small Lymph.	Large Mon.
12/20/30	3,580,000	12,800	65	78	..	..	19	3
12/22/30	4,190,000	11,200	50-60	83	..	..	14	3
12/27/30	3,680,000	13,200	60-70	67	1	..	28	4
12/29/30	3,675,000	13,700	65	72	..	..	20	2
1/ 8/31	3,630,000	11,650	60	82	..	1	14	3
1/15/31	3,740,000	10,800	60	77	..	..	19	4
Transfusion 1/17/31—500 c.c.								
1/21/31	4,500,000	15,050	70-80	79	1	1	16	3

This patient gradually became weaker due to failing strength of his cardiac muscle and expired January 23, 1931. It is of interest to note that all of surgery was very extensive with no delay after the accident and particularly the energetic serum treatment given. This case succumbed due to shock of the accident activated by failing myocardial heart.

Case 3. R. W. Police officer.

Admission 3/1/31.

Service of Dr. F. W. Moeller.

While working under automobile, jack slipped, body of car falling on right leg just above ankle causing crushing wound with compound fracture tibia and fibula two and one-half inches above ankle joint. Accident occurred 5:30 p. m. Large lacerated wound inner side of right ankle with end of tibia protruding.

Operation 3/1/31, 8:30 p. m. Removal of all debris and dirt cleansed with iodine. Bones replaced in approximation and ends sutured loosely. A plaster cast applied as high as upper third of thigh. Cast split entire length except on foot.

Bacteriology: Culture made six hours after admission showed gas bacillus infection. Profuse sero-sanguineous discharge on dressing.

3/11/31. Steinman pin put through os calcis and cast applied encasing Thomas splint. Traction applied on Steinman pin through Thomas splint.

3/10/31. Roentgenogram: Through cast comminuted fracture lower end of tibia and fibula with displacement—external lateral and anterior bowing of tibial fragments which overlap.

3/19/31. Operation: Removal of dead bone. Ends of fragments sutured with silver wire.

3/5/31. Blood picture:

White count, 7,800; hemoglobin, 60; red count, 3,640,000. Differential: Polys, 84; Eosin, 2; Small Lympho, 11.

Serum:

3/1/31. In operating room 3,000 units mixed gas serum antitetanic serum.

All subsequent serum given was gas serum.

3/2/31. 20 cc. intravenously.

3/3/31. 30 cc. intravenously.

3/3/31. 50 cc. subcutaneously.

3/4/31. 28 cc. subcutaneously.

3/4/31. 30 cc.

Remarks: 3/2/31. Wound looks suspicious of gas bacillus infection; suspicious odor; few gas bubbles escape from wound; culture showed many large bacilli some showing spore formation.

Diagnosis: B. Aerogenes Capsulatus.

3/3/31. Wound looks better; no gas escaping; some sero-sanguineous fluid in discharge; had severe reaction following first dose intravenously.

3/24/31. Roentgenogram: Fragments in good position. Silver wire in situ holding fragments of tibia. Ankle joint space increased due to extension through Steinman pin.

DISCUSSION

Dr. Roswell T. Pettit, Ottawa: I had quite a bit of experience with gas bacillus infection during tthe war. I was with the British Army in 1917, and during 1918 I was transferred to the laboratory section of the A. E. F. and given a portable laboratory for the purpose of taking it up as near the front lines as possible in order that we might make bacteriological examinations of the wounds before touched by the surgeons. I

had several assistants and we cultured over 2,000 cases making cultures on six or seven different kinds of media. Of course, we find comparatively few of these gangrene cases in civil life but gas bacillus infection was the real horror of the war. It never occurred to me that the x-ray would be of any value in the diagnosis of gas bacillus infection, but I can see now with the formation of bubbles of gas in the tissues that these accumulations of gas could probably be recognized more readily and earlier with the x-ray than with the finger by palpation.

I am sorry that Dr. Olin devoted so much time to the bacteriology of gas gangrene and left so little time for demonstration of x-ray pictures of some of these cases.

Dr. Harry A. Olin, Chicago: I have nothing to say outside of the fact that I investigated the bacteriology of this condition and it seems that the bacillus is the organism mostly found in this condition, but it never exists alone.

I was particularly impressed with the fact that gas bacillus is not as rare as we think. For instance, Dr. Jennings, in the last Annals of Surgery, April, 1931, considers that it is the most prominent factor in the production of appendicitis and its complications, and he has a series of twenty-five cases in which he has demonstrated gas bacillus infection. There is likewise a gentleman, who in a series of something like twenty-five cases of compound fracture, has found this condition and he uses the serum intravenously. However, it is thought that if the x-ray is used earlier you can not only save the life of the individual, but you can save a good deal of amputation. Most of the literature is just full of second and third amputations to save life, and I think if the x-ray were used earlier, with surgical treatment, many a limb and life might be saved.

HEMOLYTIC STREPTOCOCCUS BACTEREMIA WITH ENDOCARDITIS AND ARTHRITIS, FOLLOWING SCARLET FEVER

(Report of Case with Recovery)

MAXIMILIAN KERN, M. D.

Attending Physician, Edgewater Hospital, John B. Murphy Hospital, Chicago,
and Oak Park Hospital, Oak Park, Illinois

CHICAGO

The increasing voluminous literature on acute and subacute endocarditis with particular reference to the so-called malignant or septic type—the one with which we are here solely concerned—would appear to have left no phase of this affection untouched. But so far no definite agreement has been arrived at regarding the various factors concerning its etiology and certain of its aspects.

While some authors consider both the acute and the subacute types of bacterial endocarditis as merely different degrees of one and the same condition, there are reasons to accept acute septic endocarditis as a clinical entity distinct from the subacute form. The latter has more commonly been accepted as an endocarditis superimposed on a heart, the valves of which have been damaged by a previous disease of the rheumatic type.

We know that the onset, symptoms and course of the two affections need not necessarily be identical or even similar, an acute bacterial endocarditis suddenly involving a normal heart by the introduction of bacteria from a focus of infection, that may even have been latent.

The problem of so-called rheumatic fever in relation to infective endocarditis has by no means been fully solved. Although streptococci may be present in both, we have as yet no certainty that the two conditions involve one and the same type, so much so that recently the question was brought up regarding the possibility of mutation of different strains of streptococci in endocarditis.

Although the streptococcus hemolyticus may, and in several cases has been proven to be the causative agent of acute endocarditis, it has been established, at least to a certain extent, that mutation of the streptococcus hemolyticus into the streptococcus viridans is possible. The streptococcus viridans is the one most often found in fatal cases of acute and subacute endocarditis.

The whole problem is of special importance, because the correct therapy rests largely on its exact solution. Accordingly there is still a wide field for investigation. The following case may appropriately be submitted here before proceeding with a discussion of the involved points.

In this case we have one of acute septic endocarditis showing features not generally associated with that disease. As will be seen, the endocarditis was due to the streptococcus hemolyticus, which is not the usual causative factor. The fact that the patient made a good recovery, too, is of interest, as this disease almost invariably runs a fatal course. Thus Cowan[1] reports that out of 104 cases of acute endocarditis, 73 died in the hospital, 13 shortly after discharged from the hospital, 4 were "improved" and 2 were "very well." Only two patients were at work three years after the onset of the disease. Our case is interesting also because the favorable outcome

was, in our opinion at least, due to the administration of an autogenous vaccine which so far has not generally been credited with brilliant affects.

CASE HISTORY

R. S., male, white, American, student, aged 21, was admitted to Edgewater Hospital on February 23, 1931.

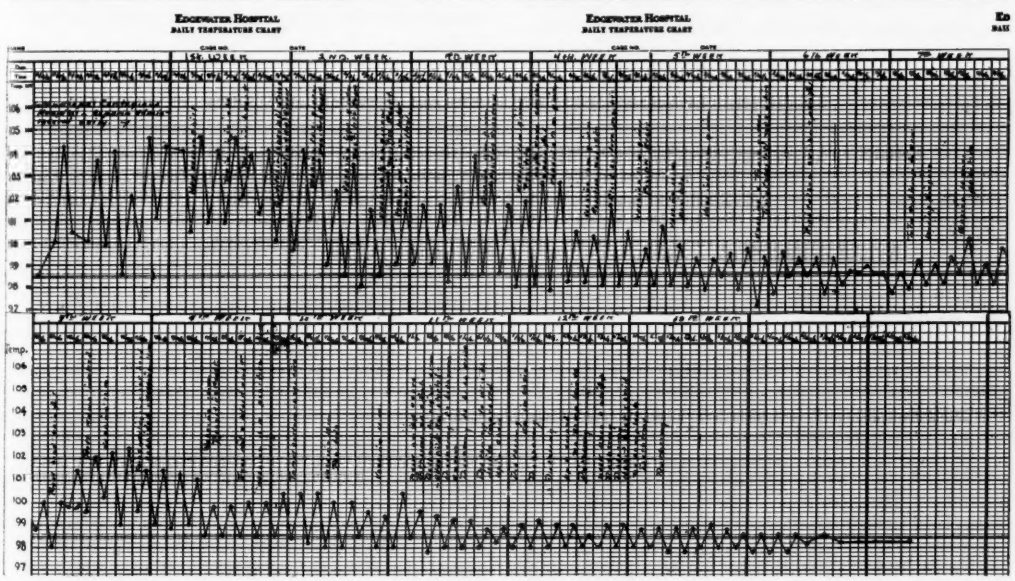
Personal History: He had gone through measles, mumps and influenza in childhood. January 19, 1931, he was taken ill with scarlet fever, and was sent to the Municipal Contagious Hospital January 22. There he developed sore throat and adenopathy, which subsided. He made an apparent recovery and was awaiting the termination of the prescribed period for discharge, when, on February 15, he suddenly began to vomit, and had a rise of temperature to 102°-105° F. He was treated at that hospital for post scarlatinal influenza. The patient was seen by me in consultation at about that time, and a blood culture was suggested to support a preliminary diagnosis of endocarditis. On February 22, the blood culture showed streptococcus hemolyticus. The next day he was transferred to the Edgewater Hospital.

Family History: The father gives a history of having been treated for "rheumatism" and of having been informed several years ago that he suffered from "heart murmurs." The mother has hypertension and arteriosclerosis. One sister has hypothyroidism with the characteristic symptoms of slow pulse, moderate obesity, dysmenorrhea; two other sisters give a negative history.

Physical Examination: The patient appears acutely ill and toxic and complains of headache, sore throat, acute pain in the cardiac region. The spleen is palpable and tender. There is a slight swelling of the ankles. Pulse 120-130; temperature 104.8° F. There is marked tenderness over the frontal and maxillary sinuses. An examination of the chest reveals a rapid heart with an audible soft murmur over the mitral valve. There are no petechiae or Osler's nodes.

Laboratory Findings: February 23: Urine; Sp. Gr. 1005, clear and straw colored, with acid reaction, a trace of albumin and urates. No microorganisms were found. Blood: R. B. C. 2, 720,000 W. B. C. 10,000; hemoglobin 64; color index 1.01: Neutro. polynuclears 88 per cent., small lymphoctyes 10 per cent., eosinophiles 2 per cent. A blood culture again revealed streptococcus hemolyticus. February 24 the patient had a severe chill. On February 25 he complained of a severe pain in the cardiac region, for which a hypnotic had to be administered. The next day a prophylactic dose of 5,000 units of scarlet fever antitoxin was administered. An autogenous vaccine was made up from the blood culture and administered intradermally. Cultures from the throat yielded repeatedly large numbers of streptococcus hemolyticus, corresponding in cultural characteristics with those isolated from the blood. The first dose of the vaccine was 0.1 cc (two minims). This gave a marked skin reaction within twenty-four hours. During the ten weeks stay in the hospital altogether eighteen injections of the vaccine was given, the amount of the dose being gradually increased to ½cc. They were always followed by a positive skin reaction and a pronounced drop in the temperature. A second injection of scarlet fever antitoxin was given intravenously March 26. On June 27 a tonsillectomy was performed under local anesthesia and a positive blood culture for streptococcus hemolyticus was obtained from the tonsils.

The accompanying chart shows the patient's temperature during his stay in the hospital. The varia-



tions following the injections of vaccine and antitoxin are particularly noticeable during the later stages, when a low grade fever was persistent.

March 25. The patient developed severe pain in the left wrist, which was aggravated by motion, with swelling and marked tenderness. X-ray examination revealed erosion of the articular surfaces with some bone destruction. Periostitis and osteomyelitis were ruled out, and the condition was apparently one of suppurative arthritis with atrophic changes in the wrist. April 4, polyarthritis developed; the knees, as well as the left ankle and wrist being affected. Sodium cacodylate was administered intramuscularly in three grain doses daily. Sodium salicylate was administered by mouth in ten grain doses four times daily. This treatment was followed by local diathermy, beginning May 1, alternating daily with general ultraviolet irradiation. The pain was greatly relieved and motion of the joints increased. The low grade fever still continued with intermissions as shown on the chart. The heart murmur persisted, although less marked, and the general condition of the patient seemed greatly improved. May 4, the blood culture was negative. The spleen was still palpable, there was no impairment of movement in the joints, but the tonsils were still enlarged and culture from the throat was positive for streptococcus hemolyticus. The urine still showed several pus cells, a few red blood cells, but no albumin. The blood pressure was 120/60.

The blood picture deserves special mention. The red blood cells, at first 2,800,000, varied during the acute stage of the disease from 2,700,000 to 3,900,000. By the beginning of May they reached 4,000,000, the highest figure recorded being 4,050,000 on May 12. The white blood cell count on February 23 was 10,000; a few days later (Feb. 27) it reached 14,900 and varied between 10,200 and 12,600. On May 4 the count was 10,900 and on May 12 13,100. Leukocytes varied from 88 per cent. (February 26 and March 4) to 64 per cent. on May 4. May 12 the figure was 58 per cent. Very characteristic was the lymphocyte count. Beginning with 18 per cent. Feb. 19 it varied down to 6 per cent. toward the end of the case. The small lymphoctye count on Feb. 24 was 14 per cent., on Feb. 28, 24 per cent; 10 per cent. on March 4; 30 per cent. on March 13; 18 per cent. March 23; 28 per cent. March 27; 30 per cent. April 1; 44 per cent. April 10; 36 per cent. May 4; 22 per cent. May 12.

Summing up, we have the case of a young man with a history showing influenza, measles and mumps, who, during the convalescent stage of an attack of scarlet fever developed sore throat suddenly with a high temperature with sharp cardiac pain, marked anemia and leukocytosis, suggesting an exacerbation of a latent tonsillitis resulting in acute septicemia and endocarditis. The therapeutic test of injections of autogenous vaccine, prepared from cultures of streptococci obtained from the blood, constantly showed remissions of the fever and finally led to recovery. Although the blood examinations were positive for bacteria, it must be remembered that even in chronic subacute bacterial endocarditis a series of negative blood cultures may be obtained which, however, does not exclude the presence of the disease. In this case the streptococcus was obtained from the throat on several occasions. The clinical course of the case suggests that the endocardial complication resulted directly from the lighting up of the more or less latent tonsillitis by the attack of scarlet fever. This opinion is not inconsistent with the latest views of investigators who have studied streptococcal endocarditis.

Discussion. The usual clinical data observed in cases of acute and subacute bacterial endocarditis including the pathology, are so well covered in the extensive literature and in text-books that their enumeration would be superfluous. It will not, however, be amiss to discuss some of the unusual etiologic and other features which have appeared in recent literature.

Investigation of any disease previous to the appearance of bacterial endocarditis has a twofold object. First, the determination of the portal of entry of the infective agent, and, second, the estimation of the predisposing effect of antecedent infections, especially those of the so-called rheumatic fever type. Since Osler[2] first described the clinical picture of subacute bacterial endocarditis in 1908, there has been an increased prevalence of both the acute and subacute types, and there is a division of opinion regarding the view that bacterial endocarditis is a distinct disease entity, which must be distinguished from endocarditis accompanying acute or subacute rheumatic fever, and that the acute ulcerative or malignant type is to be differentiated from the subacute. Thompson and Thompson,[3] who are among the latest to make an extensive research into the nature of these conditions, say that the specific form of rheumatism has a predilection for the tonsils whence it spreads either directly or by its toxins to the circulatory system. There is no definite agreement, however, that the cause is a specific streptococcus, though the consensus of opinion points to it as the chief causative organism.

Bacteriology of Septic Endocarditis. The literature shows that there may be several bac-

terial causative agents. The organisms most frequently held responsible are streptococci and pneumococci. The gonococcus and bacillus influenzae are responsible for a certain number of cases. Thompson and Thompson cite a few cases of malignant endocarditis in which the streptococcus pyogenes (hemolyticus) was found, especially in those cases which are fulminating and rapidly fatal.

Bacillus influenzae is a rare finding: Cabot's[4] fatal case of acute endocarditis showed the bacillus influenzae in the blood during life and at autopsy.

Nevertheless, the causal factors are not definitely determined and Hektoen[5] has recently stated that the next phase in our knowledge of acute endocarditis will be the study of its causative bacteria by cultural methods and its experimental production.

So far as may be judged from the available information, the streptococcus is apparently the agent in the very large majority of cases. But here some interesting questions arise.

First, as to the type or strain of streptococcus. Although the streptococcus viridans is usually considered as the agent, and is the type isolated in most fatal cases of acute septic endocarditis and in about 80 per cent. of fatal cases of subacute bacterial endocarditis, Thompson and Thompson[3] after a thorough study of the literature, state that there are at least forty distinct varieties of streptococcus viridans, while most writers merely refer to the organism found clinically as the streptococcus viridans. Further studies will have to be more precise in regard to the specificity of the prevalent or causative microbe not only in endocarditis, but also in the various rheumatic lesions, including the cardiac affections following infections.

Secondly, there is the very interesting question of possible mutation of the streptococcus hemolyticus into the streptococcus viridans. Clawson[6] and others have done experimental work on these possible mutations. In the case of acute malignant endocarditis reported by Howell, Portis and Beverley[7] it is stated that the streptococcus viridans was isolated three times from the blood. In Dominguez and Bizzozeros'[8] fatal case of malignant endocarditis the streptococcus hemolyticus, isolated from the blood after death, was nonvirulent for test animals. They also refer to the transformation of the streptococcus viridans into the streptococcus hemolyticus with changes in virulence. In Cerosoli's[9] case of malignant endocarditis the streptococci found in the blood four times during the two months that the patient lived were an-hemolytic and a viridans during the first month, but in the second month it changed to hemolytic and aviridans.

The question of mutation also is treated in Rosenow's[10] work who, as far back as 1912, considered that the streptococcus viridans, which had been isolated from infective endocarditis, was a modified pneumococcus. As far as we know, however, Rosenow's work does not appear to have been confirmed by others.

It seems, therefore, a matter of speculation how often the streptococcus viridans found in the blood at autopsy during the final stages of an actue or subacute septic endocarditis is a mutation form of streptococcus hemolyticus. In our own case this mutation had appearently not taken place, as no streptococcus of the viridans type was isolated.

Rheumatic Fever and Endocarditis. — The question of antecedent rheumatic infection has already been touched upon, and is one that has always arrested the attention of students of acute and sub-acute bacterial endocarditis. Leech[11] in fifteen cases of endocarditis in children in which the streptococcus viridans was obtained from the blood and all of which ended fatally, found that seventy-five per cent. were superimposed on rheumatic lesions of the heart valves.

Thompson and Thompson, following their exhaustive research of the literature cite Horder,[12] who expresses the view that when an infective endocarditis follows upon a rheumatic endocarditis, it seems clear that a new factor has arrived in the disease process comparable with the pyogenic infections (usually streptococcal) which not infrequently complicate scarlet fever. It is rheumatism complicated with streptococcal or other infection of the endocardium. These writers also point out that the consensus of opinion is that subacute bacterial endocarditis is a distinct disease entity, and must be distinguished from endocarditis accompanying acute or subacute rheumatism and from malignant or septic endocarditis. It appears to be undoubted that acute infective rheumatism involving the heart valves, or, in fact, any case in which the heart

valves have been impaired by previous infectious disease, does predispose to subacute endocarditis, although such predisposition is not necessarily a factor in acute bacterial endocarditis. Zischinsky[13] who reported ten cases of scarlet fever complicated by endocarditis in which seven of the patients died, is of the opinion that the diagnosis of endocarditis due directly to scarlet fever can be proved only by necropsy.

CONCLUSIONS

From the foregoing consideration we are led to the conclusion that in our own case the acute endocarditis was the direct result of involvement of the heart by streptococci (or their toxins) originating in the tonsillar infection which developed as a recrudescent sore throat, a condition which occasionally devolps as a sequela of scarlet fever. None of the symptoms of a subacute rheumatic (streptococcal) origin were present, and the arthritic manifestations which occurred in the course of the case were due to to the same infective agent as that of the endocarditis. While there was nothing to disprove the existence of previous injury to the heart, there was no clinical evidence of its presence until well past the attack of scarlet fever and tonsillitis.

Incidentally, the case supports the view expressed in the Report of the (British) Special Committee Upon Rheumatic Disease in Children (1926)[14] that in children attacked by scarlet fever whose tonsils have not been removed, rheumatic fever lesions involving the heart are likely to be more severe than in those whose tonsils have been removed.

Mention should be made regarding the use of autogenous streptococcal vaccine in this case.

No successful treatment has yet been discovered for the various forms of streptococcal carditis by vaccine therapy and according to Thompson and Thompson it has been tried with little success. They state that if the actual species of the streptococcus causing the various cardiac conditions were definitely identified and isolated, more specific and definite therapeutic results might be obtained. An autogenous vaccine as used in our case may, therefore, be the nearest approach to this ideal.

SUMMARY

1. The study is based on one case, which, however, is apparently clear cut as regards the etiology of septic endocarditis.

2. Streptococcal endocarditis, especially of the hemolytic type, is almost invariably fatal.

3. The apparently complete recovery of even one case of such gravity, by an autogenous vaccine made after the identification of the causative agent, is sufficiently encouraging to justify further trials in similar cases.

4. The high mortality of streptococcal endocarditis demands earnest scientific research, the results of which, under our present advanced knowledge of microbiology, should clear up many obscure problems and thereby lay the foundation for a rational and successful therapy.

REFERENCES

1. Cowan, J.: Glasgow med. J. 1927, Cviii, 338.
2. Osler, W.: Quart; J. Med. 1908-9, P. 219.
3. Thompson, D. and Thompson, R.: "Researches Upon the Role of Streptococci in Carditis." Ann. Pickett-Thompson Research Lab., November, 1928, IV, Part 1, 131-250.
4. Cabot: *New England J. Med. cc*, 832.
5. Hektoen, L.: *Arch. Pathol, Feb.* 1930, 1x, 540.
6. Clawson, B. J.: *Arch. Intern. Med.*, 1924, xxxiii, 157.
7. Howell: K. H., Portis, B. and Beverley, D.: *J. Infect. Dis. July* 1926, xxxix, 11.
8. Dominguez, C. and Bizzozero, R. C.: "Endocarditis Maligno a Evolucion Zeirta Producida por et estreptococco Hemolitico." *Prensa. Med. Argent.*, Jan. 10, 1928, xiv, 826.
9. Cerosoli, A.: Mutazione di uno streptococco Anemolitico e Aviridans in Emolitico Nell' Endocardite Maligna a Tenta Decorso." *Riforma Med., Napoli*, 1929, xlv, 1074.
10. Rosenow, E. C.: "Experimental Infectious Endocarditis." *J. Infect. Dis.*, 1912, xi 210.
11. Leech, C. B.: *Amer. J. Med. Sc.* November 1930, clxxx, 621.
12. Horder, T. J.: "Infectious Endocarditis" *Quart. J. Med.*, 1909, ii, 289 and *British Med. J.*, Apr. 3, 1926, i. 641.
13. Zischinsky, H.: *Jahrb. F. Kinderheil, Berlin*, May, 1930, cxxvii, 253.
14. Report of Special Committee upon Rheumatic Disease in Children, *Brit. Med. Jour.* Association Supp., July 3, 1926.

1549 Pittsfield Bldg.

SECONDARY ANEMIA*

RICHARD F. HERNDON, M. D.,

SPRINGFIELD, ILL.

Anemia of one sort or another is probably one of the most common conditions that the general practitioner, surgeon or specialist is called upon to consider. In normal healthy individuals the corpuscles and hemoglobin of the blood vary within remarkably narrow limits. However, when we make any serious routine effort to determine the condition of our patient's blood it is surprising how frequently a significant reduction in one or both of these elements is

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found. Undoubtedly many of the indefinite cases of neurasthenia, and the various states of malnutrition, weakness and below parness result from only a moderate anemia which has been present for a long period of time. Functional and economic recovery after surgical procedures and medical regimes is all too often prevented by the persistence of a low grade anemia. Proper treatment of this will often cause a striking improvement in the patient's condition. It has been the steadily increasing recognition of these facts that has stimulated research and led to the recent advances in our concepts of anemia. Their very frequency justifies us in reviewing their established features.

Mechanism. Three mechanisms or their combinations may be concerned in the production of anemia.

1. Blood loss or hemorrhage.
2. Diminished production of blood.
3. Increased destruction of blood.

(Hydremia as judged by the ordinary standards of investigation would appear to be anemia but can usually be distinguished on clinical grounds.)

In a given case it is helpful to know which of these factors is of greatest etiologic importance or their relative importance when they act in combination. In ordinary clinical work the activity of the bone marrow is judged by the presence of immature cells in the peripheral circulation. In specimens fixed and stained by the usual methods the chief evidences of immaturity are the presence of nucleated, polychromatophilic, and, probably, stippled red cells. None of these forms have been generally studied with a view of obtaining a quantitative index of bone marrow activity. However, with the use of vital stains another immature cell, the reticulocyte, is easily demonstrated and has been intensively studied. Their number is generally considered to be the most reliable measure of the production of blood and so may be taken as an index of bone marrow activity. Normally they make up about 0.8 per cent. of the red cells.

On the other hand the icteric index, except in patients with hepatic lesions or obstructed biliary passages, is a measure of the breakdown of hemoglobin and may, therefore, be taken as a guide or index of the destruction of red blood cells. It is usually five, with normal variations between two and ten. So that in a given case if we know the degree and progress of the anemia, the reticulocyte count and the icteric index we are in a fair way to judge the origin of the anemia and are in a good position to prescribe treatment and give a prognosis. Douglas and Tannenbaum[1] have recently published a very interesting discussion of secondary anemia based on these criteria.

Classification. The conditions that may cause secondary anemia are practically as numerous as those that may affect man. They are variously classified according to the writer but it seems simpler to adhere to the mechanisms already described. Thus we have three types.

Anemia Due to Blood Loss or Hemorrhage. The anemia of blood loss or hemorrhage is to be recognized by the recognition of the bleeding. In acute cases the blood shows evidences of active regeneration. In fact, an acute hemorrhage is one of the most powerful stimulants of bone marrow activity. In chronic cases blood production may be very considerably impaired, probably due to a marked reduction in the iron reserve as well as nutritional depression of the bone marrow. In cases with good regeneration the reticulocyte count will be high and in cases with poor regeneration it will be low. In both acute and chronic hemorrhage the icteric index will be normal or low.

I would like to emphasize once more a fact we are all likely to forget, namely, that chronic, recurrent or persistent loss of blood, particularly from the gastro-intestinal tract, is much more frequent than any of us suspect. Among the conditions that may cause it are carcinoma of the stomach, duodenal ulcer, benign ulcer of the small intestine or cecum, carcinoma of the colon, polyps of the colon and hemorrhoids. It should also be stressed that these conditions may be present with few if any abnormal symptoms and in the presence of entirely negative roentgenologic examinations. The presence of bleeding, however, can be recognized by repeated examination of the stools.

Anemia Due to Diminished Blood Production. Anemia that is wholly or predominantly due to diminished blood production can usually be easily recognized from the general picture. In it there is a marked reduction in hemoglobin with a low color index and achromia. There is little change in the red cells themselves, some variation in size, but little variation in shape

with a tendency for the predominating cell to be slightly smaller than usual. The young cells, the reticulocytes, nucleated cells, polychromatophiles and stippled cells are few in number or absent. The polymorphonuclear leucocytes also tend to be reduced in number and to have an abnormal number of lobulations, which means that they are old. The icteric index is, of course, normal or low.

In these cases the bone marrow usually shows some atrophy or gelatinous degeneration, though there may also be areas of hyperplasia. If the young cells in the blood are increased and the level of the anemia is not rising, one should look for evidence of hemorrhage.

This type of anemia makes up the great majority of the cases we ordinarily see. It includes:

Infections of all types, including those with intestinal parasites.

Intoxication from poisoning—Lead, mercury, arsenic, benzol.

Intoxication from diseases—Nephritis, hepatic cirrhosis, gastro-intestinal disturbances, malignancy.

Pregnancy.

Senility.

Disturbances of glands of internal secretion, as myxedema.

Deficient nutrition—Milk diets, particularly at the end of infancy, not infrequently in peptic ulcer; the peculiar diets of recluses and the aged.

These two types of anemia, that is, anemia due to blood loss and anemia due to deficient blood production, are usually called simple anemias because no radical change has taken place in the type of blood formation such as occurs in true pernicious anemia. Neither is distinct evidence of blood destruction seen in these simple anemias which is in contrast to pernicious anemia and the hemolytic anemias. To be sure, in some infections, notably sepsis and arthritis, there is often some acute blood destruction though the evidences of it are not manifest and subsequently the depressed marrow activity prevents regeneration. The patients are pale, not icteric, and their symptoms are those of anemia along with the symptoms of whatever factor is causing the anemia. The reason they seem sicker than pernicious anemia patients is that in either instance they suffer proportionally to their hemoglobin level rather than to their red cell level.

Anemia Due to Increased Blood Destruction. We now come to the third type of anemia, that is, anemia due wholly or predominatingly to increased blood destruction. Here again we have a fairly characteristic general picture that is usually easily recognized. The icteric index is high and the patient himself icteric or yellowish. There is a relatively slight reduction in hemoglobin with a relatively or absolutely high color index. The predominating red cell tends to be slightly larger than normal, but with these macrocytes are found fragmenting cells and microcytes. The immature red cells are increased and with them there is a leucocytosis with increased numbers of young marrow cells. In addition there is usually enlargement of the spleen and liver.

This variation in the size of the erythrocytes which I have mentioned seems to be quite definite and of considerable diagnostic significance. Haden[2] in 1923, and more recently Murphy and Fitzhugh[3] have given us accurate and fairly simple methods for its determination.

It will be recalled that when simple anemia due to known cause was discussed, it was mentioned that a relatively slight degree of blood destruction occurred in some of these cases. When this destruction becomes very distinct we refer to the cases as forms of hemolytic anemia. Such conditions may be either acute or chronic. When true pernicious anemia is excluded the hemolytic anemias make up only a very small proportion of those usually seen. They occur most frequently during the course of:

Sepsis—streptococcus sepsis particularly, as subacute bacterial endocarditis, pneumonia, malaria, syphilis.

Fish tapeworm.

Pregnancy.

Poisoning by acetanalid, phenol, benzol and nitrobenzol, toluol and trinitroltoluol, analin and its derivatives.

These cases differ from true essential hemolytic anemia in that their course is shorter, the enlargement of the spleen is less, the increase in the bone marrow activity is not so marked, and the fragility of the red cells to salt solutions is not increased.

Thus as Minot[4] says, "Cases of anemia due to known cause such as chronic sepsis may take on the features of chronic hemolytic anemia. Such cases may resemble those in which the cause is not recognized, perhaps because the cause in general is similar, being recognized in one instance and not in the other. From this we may see what is so true in all blood conditions, namely,

that through atypical cases one condition approaches another, and that the anemias are dependent upon the effect of the reaction caused by a known or unknown agent on the blood forming and blood destroying tissues."

Prognosis. The prognosis in secondary anemia depends upon the cause, duration and intensity of the anemia and the degree of involvement of the bone marrow.

TREATMENT

It is obvious that little can be expected in the treatment of secondary anemia until the cause has been recognized and removed. However, even when this is done spontaneous recovery is often slow and not always complete. Help is usually necessary. The work of Minot and Murphy, Whipple and Robscheit-Robbins, of Castle, Hart, Steinbock and others has given us a much more rational and encouraging outlook than ever before. Nevertheless, an enormous amount of investigation will still be necessary before a really satisfactory conception can be reached. At the present time it is logical to deduce that, in addition to rest and fresh air, first place should be given to an adequate, well balanced diet rich in vitamins and those foods which favorably enhance blood formation, and that to this should be added large doses of iron. Each case must be looked upon as an individual feeding problem, giving consideration to all aspects of the patient including his weight and the state of his gastro-intestinal tract. But we must still wait future observations to tell which diets are best for the different sorts of anemias and the mechanisms by which they act. Further it has been shown that a long period of time is necessary to permit the formation of those hemoglobin building factors which precede the formation of hemoglobin itself, so that whatever methods are used they must be persisted in for some time. It may be added that more cases of anemia will probably be cured in the future by diet and its derivatives than by other measures.

The foods that are of most value in blood building are the meats, green vegetables and fruits. The starches and fats do not seem to be of any direct importance. Of the meats liver, kidney and red muscle meat are preeminent. Whole liver seems to have about five to ten times the potency of liver extract in secondary anemia. It seems to be of especial value in cases of failure of regeneration after loss of blood. There may be some reason, based on Castle's work and clinical observation, to think that liver extract might be helpful in those cases of secondary anemia associated with organic disease of the stomach, because an activating substance in the stomach wall may be absent in such cases. In regard to the green vegetables, it is interesting to note that Whipple and Robscheit-Robbins have concluded that their mineral content is more important than the chlorophyll nucleus. The most valuable fruits seem to be oranges, grapefruits, apricots, peaches and prunes. Any possible deficiency of the vitamins may be easily overcome by the addition of yeast and cod liver oil.

All the recent research on secondary anemia has served not only to emphasize the need for iron but also the desirability of giving larger doses than we formerly used. In anemias of any appreciably severity it now seems desirable to give about the equivalent of a gram of metallic iron a day. This seems to be more efficient in an acid solution and in a soluble form. Ferric citrate or ferric ammonium citrate in doses of 90 grains a day seems to be as good a preparation as any. Iron is particularly necessary in anemias due to chronic blood loss. There is both experimental and other evidence that iron supplements the action of other substances, e.g., iron and liver together are more effective than iron alone or liver alone.

Of the other features of the treatment of secondary anemia that might be worth consideration I believe there are two which should be mentioned. First, I think that the pendulum of opinion has swung too far away from transfusions and that many severe cases could be more quickly corrected or prepared for necessary surgical procedures by one or more transfusions. And finally, that there is at present no apparently good reason for the use of arsenic, splenic extract, bone marrow, or intravenous or intramuscular medication.

REFERENCES

1. Douglas, A. H., and Tannebaum, H.: The Mechanism of Secondary Anemia, Arch. Int. Med. 45: 248, 1930.
2. Haden, R. I.: Accurate Criteria for Differentiating Anemias, Arch. Int. Med. 31: 766, 1923.
3. Murphy, William P., and Fitzhugh, Green: Red Blood Cell Size in Anemia, Arch. Int. Med. 46: 440, 1930.
4. Minot, George R.: Clinical Discussion of the Anemias, Oxford Med. Vol. II, 641.

KIRCHNER PIN IN FRACTURES OF LONG BONES

ARTHUR H. HAUBER, M. D.
CHICAGO

In a series of fractures of the femur and tibia, I have been using the mechanical con-

Fig. 1 A Fig. 1 B

Fig. 1 A, Case 1. Oblique fracture of upper third in young girl before reduction by Kirchner pin method.
Fig. 1 B, Case 1. The same about two months after reduction, bony union, no demonstrable shortening. At no time a cast or splint used.

trivance of Professor M. Kirchner of Koenigsberg, Germany, to secure extension.

The apparatus consists of a span-buckle and a thin steel pin, about the size of the old-fashioned hat pin, which is driven through the bone by means of an electric motor. After this

Fig. 2 A Fig. 2 B

Fig. 2 A, Case 2. Intertrochanteric fracture in woman 70 years old. Abduction with Kirchner pin extension used.
Fig 2 B, Case 2. Perfect alignment secured and function result practically normal. No cast was used.

Fig. 3 A Fig. 3 B

Fig. 3 A, Case 3. Spiral fracture extending from greater tuberosity almost half way down the shaft.
Fig. 3 B, Case 3. An almost 100 per cent. functional result secured in man middle aged. Went to work as an electrician after four months from date of injury. A posterior supportive splint was used when this radiograph was taken before bony union was complete.

manoeuver the pin is put under tension with a specially constructed instrument in order to give

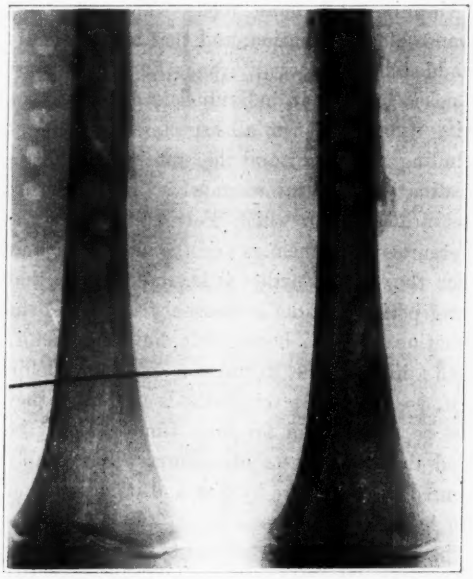

Fig. 4 A Fig. 4 B

Fig. 4 A, Case 4. Shows pin in situ and fracture reduced. Pin put in somewhat high up from distal extremity to avoid any possible injury to epiphysis of bone in young person. The pin is not at right angle to the bone, but this is of no consequence.
Fig. 4 B, Case 4. Bony union complete with perfect function and mobility. No apparent shortening.

the thin steel wire, which is all it really is, sufficient strength to withstand the application of weights by rope and pulleys.

I have found this method superior to the traction secured by adhesive tape, or Steinman's nail and tongs. It has several advantages. Traction by adhesive tape affords pull on the skin, then on the underlying muscles and lastly on the bone. Very often the muscle pull is on both ends of the fractured bone and therefore much pull is lost. There are other disadvantages to adhesive tape traction which are obvious to those doing orthopedic surgery. The Steinman nail and tongs mutilate the tissues, cause much pain and infections. All these ill-effects seem to be absent in the Kirchner pin method.

The Kirchner pin requires less weight to bring the ends of the bones into apposition, because the pull is directly on the lower fragment, and usually no more than six to eight pounds in chil-

Fig. 5 A (2 views)

Fig. 5 A, Case 5. A. P. and lateral projections of a comminuted fracture middle and upper thirds of femur in child.

Fig. 5 B

Fig. 5 C

Fig. 5 D (2 views)

Fig. 5 B, Case 5. Reduction of fracture by means of skeletal traction with Kirchner pin, showing pin in situ in A. P. view.

Fig. 5 C, Case 5. Lateral view of X-ray plate picture showing span buckle or "Horse Shoe" (as the little folks are apt to call it) in position.

Fig. 5 D, Case 5. Pin removed and bony union almost complete at end of 33 days from date of injury.

Fig. 5 D, Case 5. Lateral view showing slight anterior convexity which is natural for child's femur 4 years old. There is no demonstrable shortening present and motion of femur is practically normal. This femur should be ready for weight bearing with safety at the end of ten weeks.

dren and ten to fifteen pounds in adults are used. The pin is left in one month to six weeks and no plaster cast or other support is needed. A few sand bags hold the bones still enough, and by means of an overhead frame (Balkan frame) the patients can adjust themselves for cleaning and use of bed-pans. Usually only one hypodermic of morphine is used the first day and no more afterwards. In some cases it is entirely omitted. Removal of the pin is easy and then a light cast or splint may be used. However, I have done away with all these appurtenances. Five days after removal of the pin the bone, by x-ray, shows no trace of the hole in the bone. The skin has small scars ¼ inch in diameter. Just above the epicondyles in femur fractures seems to be the proper place for the pin and through the os calcis in tibia fractures.

I have used this method in intracapsular fractures of the femur, and regardless of location of fracture, secure a good functional result with from ¼ to ⅜ inch shortening. This much seems unavoidable because of absorption of dead osseous tissue at the site of the break.

2800 Milwaukee Avenue.

DUPUYTREN'S ABSCESS

J. E. Bellas, M. D.
PEORIA, ILLINOIS

Dupuytren is a name well known in surgery and intimately associated with a certain leg splint, a type of ankle fracture, and with a contracture of the palmar fascia and its digital prolongations, but its association with a certain type of pelvic cellulitic infection is less familiarly recognized.

Pelvic infection can be conveniently divided into intraperitoneal and extraperitoneal. The intraperitoneal infections are, of course, salpingitis, salpingo-oöphoritis, pelvic peritonitis, abscess in the pouch of Douglas, and, occasionally, an appendiceal infection. Extraperitoneal infections are commonly parametritis, and less commonly extension from a psoas abscess, perinephritic abscess and rarely inflammation of the connective tissues following cystoscopic manipulations, for example; ureteral perforation and injection of sodium iodide through such perforation. It is very important that these two general types of infection be differentiated from one another, as the surgical approach when indicated differs, and grave consequences can follow upon instituting the wrong procedure in a given case.

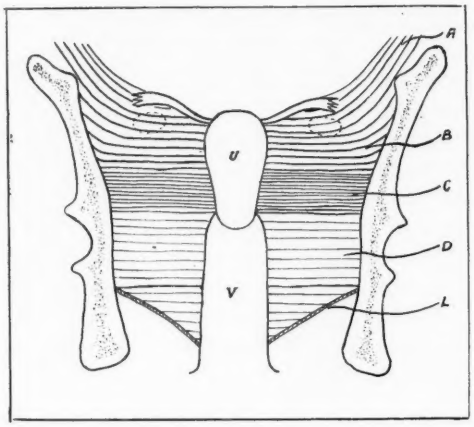

Fig. 1.

Figure 1. Frontal section through the pelvis (diagramatic) to show the lateral connective tissue.
A—Infundibulopelvic ligament.
B—Intraligamentary connective tissue.
C—Lateral parametrium.
D—Paravaginal connective tissue.
L—Levator ani.

Fig. 2.

Figure 2. Transverse section at level of internal os to show anterior and posterior ramifications of the pelvic connective tissue.
B—Bladder. C—Cervix. R—Rectum.

The term pelvic cellulitis is familiar to all and in a general way indicates inflammation of the pelvic connective tissue, but its anatomical manifestations from the point of view of localization and surgical treatment are frequently not appreciated. To understand more clearly its clinical and surgical features, a knowledge of the anatomy of the pelvic connective tissue with all its ramifications is essential.

Pelvic cellulitis may lodge in any part of the connective tissue distribution but this paper is more concerned with that which involves the lateral connective tissue, namely: the paravaginal, the lateral and the intraligamentary parametrium, so as to form a prominence extraperitoneally above Poupart's ligament.

Etiology: This condition notoriously results from the induction of abortion on the part of the laity with the serious sepsis that may follow, but it may arise even in clean cases of therapeutic abortion where every aseptic precaution has been undertaken. It may also develop from a flare-up of a previous dormant parametritis. The offending organism is usually the streptococcus which explains the severe septic course that these cases may run.

The following case-history is typical of the development and progress of such cases.

The patient, Mrs. A. K., was a woman of 29 years of age for whom a therapeutic curettage had been done for a pernicious hyperemesis gravidarum which all the accepted methods had ceased to check. Following the curettage, the patient developed pain and tenderness on the left side which became quite localized. There was no pain on the right side, or in the midline. Gradually, a mass began to be felt above Poupart's ligament extending laterally to the left loin. The patient developed pain at the end of micturition, and a soreness in the kidney region. Urinalysis showed albumin, three plus; pus, four plus.

By the ninth day a definitely localized mass could be felt and in continuity with this, a cord of induration extending laterally towards the left loin could be palpated. A vaginal examination showed the right fornix negative. The left fornix disclosed a hard, indurated crescentic concavity extending from the side of the uterus to the pelvic wall. By bimanual examination, the mass above Poupart's ligament could be felt in direct continuity with the induration in the left fornix. No fluctuation could be elicited.

Diagnosis: Dupuytren's abscess or parametrial abscess. It was decided to operate for this condition and accordingly an operation was done on the tenth day, by the abdomino-vaginal method. The drainage tube was left in for six weeks and the patient made an uneventful recovery.

It is the symptom-complex of pain with micturition, pain in the kidney region with the presence of pus in the urine, that leads the uninitiated to order a cystoscopic examination and ureteral catheterization. Pus in the urine is due to a cystitis aroused by the contiguous inflammation. Indeed, a perforation into the bladder has been known to occur and to give rise to a large amount of pus in the urine. Pain around the region of the kidney is due to extension of some of the inflammation along the cellular tissue planes.

Surgical Methods: Two methods have been available, the vaginal and the abdominal.

The vaginal method attempts through a posterior colpotomy wound to dissect laterally towards the region of the abscess or inflammation, with the insertion of a tube for drainage. This method is necessarily a blind method with grave danger of injury to the ureter, and uterine artery, and with the possibility of a perforation into the peritoneal cavity. One patient that came under my observation died from general peritonitis as a result of the vaginal method being employed. This route is further discountenanced by the fact that the drainage tube frequently slips out which necessitates painful reinsertion, little appreciated by the patient.

The abdominal method is an extraperitoneal method that gives better exposure but has the disadvantage of not establishing dependent drainage. Convalescence is therefore prolonged and disappointing.

The combined abdominal and vaginal method that I saw practiced in the Kermauner Frauen Klinik of Vienna offers a method that combines the advantages of both the above without including the disadvantages of either. This is undoubtedly the best procedure. This gives good exposure, avoids blind dissection and establishes drainage abdominally and vaginally.

Technique: An inguinal incision is made above and parallel to Poupart's ligament over the summit of the abscess or induration. The aponeurosis and abdominal muscles are split and

separated to expose the preperitoneal areolar tissue, and the reflection of the peritoneum. The latter is pushed upwards out of the way, protected by gauze, and the outline of the parametrial mass defined. (In the case above described, the broad ligament was one and one-fourth inches thick, hard and indurated and a tapering cord-like extension passed laterally towards the left loin). The field is protected by

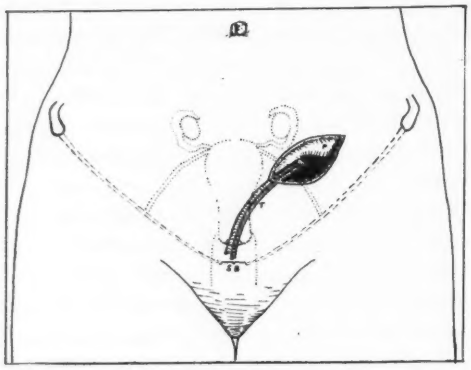

Fig. 3.

Fig. 3. Showing location of incision and position of drainage tube. (Semi-diagrammatic.)
P—Peritoneal reflection displaced upwards.
T—Split rubber drainage tube.
S. B.—Symphysis pubis.

gauze and a shallow incision is carried into the mass to allow blunt finger dissection along the track of the inflammation.

In the case of an abscess, after the pus is drained, the finger easily passes along the abscess cavity to its most dependent point. In the presence of the "woody" type of inflammation before its resolution into pus, the interior of the mass is friable enough to permit passage of the finger along the right plane. By means of bimanual examination, the dissecting finger can easily be guided to the vaginal finger behind the cervix without fear of injuring either the ureter, or the uterine artery. Under the guidance of the dissecting finger, or of a blunt forceps, a transverse posterior colpotomy incision is made behind the cervix. A semicircular stiff rubber drain is inserted abdominally to emerge along the created tract into the vagina, the concavity of the tube being made to face the uterus to prevent pressure necrosis effects upon the ureter, or uterine artery. The buried upper end of the drain is fixed by a silkworm gut suture, the ends of which are passed through the abdominal wall and skin on each side of incision and tied to one another over a rubber tube. This effectually prevents the vaginal drain from slipping out. Finger dissection is done to establish a canal in the lateral inflammatory extension, and a Penrose drain is inserted into this canal and fixed to the skin. The skin is closed loosely around the drainage tube.

After treatment: The abdominal Penrose drain is not removed until the abdominal drainage has ceased or has materially subsided. The vaginal drain is left in for six weeks to make quite certain that no secondary recrudescence of remaining inflammation occurs. Dressings are applied above while needed; antiseptic vaginal douches are given daily after five days. As soon as the patient is able (ten to fourteen days) she is encouraged to get up and be around, as the upright position favors vaginal drainage.

Chronic invalids, perhaps for life, have been made where treatment has been delayed or where an intraperitoneal operation has been done as a result of a false conclusion. Sometimes only the ultimate rupture of the abscess above Poupart's ligament has pointed the way to the proper course of treatment.

SUMMARY

1. Dupuytren's abscess is an extraperitoneal parametrial abscess forming a prominence above Poupart's ligament.

2. The infection is streptococcus in nature and usually follows abortion, criminal or therapeutic.

3. Knowledge of the anatomy of the pelvic fascia aids clinical and surgical appreciation.

4. A typical case-history is reported.

5. Early surgical treatment is advisable to prevent chronic invalidism and the abdominovaginal extraperitoneal operation is the procedure of choice.

REFERENCES

1. Dupuytren, Guillaume: "Abcés developpé dans le petit bassin" Rev. med. franc et etrange., Paris 1829, I, 367-371.

2. Cullen, Thomas S.: The Surgical Methods of Dealing with Pelvic Infections. Surg., Gynec., and Obst., XXV, i, 134, July, 1917.

3. Brady, Leo: Extraperitoneal Pelvic Conditions in Women. Jour. A. M. A., 95, 388, Aug. 2, 1930.

4. Miller, C. Jeff: Puerperal Infection. Lewis' Practice of Surgery, X, vii, 24.

5. Sargent, James C.: An Unusual Ureteral Injury. Jour. of Urol., XXIV, v, 513, November, 1930.

THE CHALLENGE OF SYPHILIS*

ANDY HALL, M. D.
State Director of Public Health
SPRINGFIELD, ILL.

Perhaps no other single public health problem is of greater importance and magnitude than syphilis. This disease causes a vast amount of physical and mental delinquency. The volume of mortality listed under the title of syphilis and its well established sequelae falls far short of that for which this disease might reasonably be held responsible.

The most pathetic result of syphilis is blindness. Royer declares that 15 per cent of the blindness in the U. S. and a much higher percentage of impaired vision is but a manifestation of leutic infection. Speaking before the Social Hygiene Institute at Fort Worth, Texas, last fall, he said:

"It is safe to say that approximately 15 per cent of all blindness in America is due to syphilis, and, for every case of blindness traceable to syphilis physicians, health workers and social groups meet a still greater number, certainly several times as many, whose vision has been seriously impaired because of the ravages of this disease."

In Illinois 3,517 people were blind pensioners in 1928 and it is quite probable that a considerable number of blind persons fail to qualify for pensions under the present law. It seems, therefore, that syphilis is the cause of more than 500 cases of blindness in this State which cost the government $200,000 per year, and deprive the individuals from normal happiness and society from the full productive efforts of normally healthy people.

One out of each 7 men and 1 out of each 17 women admitted to the State hospitals in Illinois are victims of general paralysis. The number of general paralysis patients admitted to State hospitals is second only to the number admitted because of dementia praecox. For the last eight years an average of 557 paretics have been admitted annually, a matter of nearly 15 per cent of total admissions. On the other hand, the very best estimates indicate that not more than 26,000 new cases of syphilis occur annually in Illinois. Thus it appears that 15 per cent of the patients of State hospitals are recruited from a group that makes up less than one-half of one per cent of the population. These are the patients who are known to have become public charges because of syphilis.

The damage done to the general population by the 26,000 syphilitic infections per year is only partially expressed by the number of blind and those who become inmates of State hospitals. Several investigators, including Holland, Palmer and Williams, have shown that from 7.6 to 12.8 per cent. of stillbirths are due to syphilis. Browne considers that syphilis is the commonest cause of premature labor. The significance of these figures is clear when it is shown that 4,500 stillbirths and 2,500 infant deaths due to premature birth occur annually in Illinois. Estimating that 10 per cent of the stillbirths and 25 per cent of the prematurities are caused by syphilis, these figures indicate that well over 1,000 infant lives are lost annually in the State because of syphilis.

This loss can be almost wholly prevented by appropriate treatment. Moore, of Baltimore, studied the history of 449 women who were discovered during pregnancy to have a positive Wassermann. Of the children born to the 169 who received no anti-syphilitic treatment only 40.8 per cent. were healthy. Of the children born to the 102 who had inadequate treatment, 60.7 per cent. were healthy. Of the children born to the 178 who had adequate treatment, 96.6 per cent. were healthy.

Trow, of Toronto, reported that of 41 pregnancies before treatment in 22 syphilitic women, 8 were miscarriages, 6 stillbirths, 7 living syphilitic children, 12 living non-syphilitic children, 9 died from syphilis and 2 died from other causes. These figures show bad results in 68 per cent. of the pregnancies. Out of 32 pregnancies occurring among the same 22 women after treatment was given there were no miscarriages, 3 living syphilitic children, 28 living non-syphilitic children and 1 dead who had had syphilis. This series showed bad results in only 12.5 per cent. of the pregnancies.

These data are typical of reports made by numerous investigators and clinicians and show that treatment of syphilitic prospective mothers

*Read before Secretaries Conference of Illinois State Medical Society, May 5, 1931, at East St. Louis.

will prevent the infection in fully 90 per cent. of the offspring.

Royer says:

"It is now generally believed that those responsible for the prenatal care should routinely test the blood of the expectant mother, unless complete family records rule out the possibility of tainted blood, and that all expectant mothers found to have positive Wassermanns should be adequately and efficiently treated not only to avert syphilis of the general tissues of the unborn but to prevent syphilitic attack on the eye tissues and possible loss of vision or blindness later."

Another way to measure the size of the syphilis problem is to examine the morbidity statistics of the U. S. Nobody is so credulous as to believe that anything like all cases of syphilis which comes to the attention of physicians are reported. It is generally conceded, moreover, that the cases of other communicable infections are more completely registered. Even under these circumstances there were 1,226,643 more cases of syphilis than of typhoid fever reported in the U. S. during the 8 years ended with 1929. During the same period there were 1,193,662 more cases of syphilis than smallpox; 721,033 more syphilis than tuberculosis; 598,026 more than diphtheria; 43,956 more than scarlet fever and 189,750 more cases of syphilis than of whooping cough reported. There were more cases of syphilis reported than smallpox, tuberculosis and typhoid fever combined. In Illinois, where more than 12,000 fresh cases of syphilis are reported annually, the relative volume of notification is much the same as that in the country at large.

A little more accurate information has come from maternity hospitals where Wassermann tests have been made on all admissions over a period of years. In the Chicago Lying-in-Hospital, for example, Stillians began to make Wassermann tests in 1917. During the next 10 years he found 6 per cent. of the 6,954 admissions, mostly white, syphilitic. In 14 similar studies involving 58,000 unselected patients in 30 different clinics the rate of syphilis varied from 3 to 23 per cent., the rate falling below 7 per cent. in only 4 studies.

Again, the mortality statistics shed some light upon the question. In 1929, no less than 1,075 deaths in Illinois were ascribed directly to syphilis, locomotor ataxia and general paralysis of the insane. Heart disease killed 16,574 in the same year and conservative estimates charge syphilis with 10 per cent. of the fatalities ascribed to heart disease. Assembling the mortality date it seems that syphilis may be justifiably charged with 3,732 deaths in Illinois in 1929. This figure includes an estimate of 1,000 stillbirths and deaths due to premature birth, 1,075 charged directly against syphilis or its sequelae and 1,657 reported as heart disease.

Furthermore, Greer has called attention to the fact that the Wassermann test was positive almost twice as frequently in 982 tuberculous patients as in 962 non-tuberculous patients examined in his clinic. This finding leaves the suggestion that syphilis may sometimes be a factor in bringing on tuberculosis.

Jacuemart and Pfeiffer have written a monograph in which they conclude from their personal experience that carcinoma never occurs without being connected with syphilis while Verrotti, an Italian investigator, reports the recovery of two cases, one of ulcer of the stomach and one of ulcer of the duodenum, under specific anti-luetic treatment without surgical operation. Other authors hold that carcinoma develops on scars caused by syphilis and point to the frequency of positive Wassermanns in carcinoma patients. They also point to the frequency of carcinoma in subjects with congenital syphilis.

If syphilis is a factor in the production of either tuberculosis or cancer, or both, the usual evidence cited to show the magnitude of the problem of syphilis falls far short of the mark.

The statistics presented give a fair idea of the prevalence of syphilis and of the problem involved. At first glance the job of drying up the springs of the disease may seem too gigantic to offer hope of success. There are precedents, however, which show that great improvement can be expected to follow vigorously applied practical measures.

In the U. S. Army the annual admission rate from venereal diseases varied between 168 and 180 per 1,000 men per year before efforts at control were begun. After the enactment of a law in 1912, penalizing those who contracted these diseases, the admission rate fell to about 100. With the recruiting of many troops dur-

ing the World War came vigorous efforts at venereal disease control through education in sex hygiene and in providing prophylactic facilities. Another definite decline in the admission rate took place so that for the last 5 years it has been below 50 per 1,000 military personnel per year. This represents a reduction of over 70 per cent. within 20 years.

In Great Britain and in Europe, except France, the decline in syphilis has been so noticeable that Stokes declares:

"So marked is the drop that one may almost foresee the extinction of the disease, given sufficiently continuous application of present methods."

In England, it is the opinion of Colonel Harrison of the Ministry of Health, that syphilis has decreased five-sixths in that country since 1918. A survey in Germany indicates that the decline has been two-thirds in primary and secondary syphilis and one-third in congenital syphilis.

The plan of attack in Europe is simple. It is based upon the assumption that syphilis can be stamped out by treating infected persons. To that end treatment has been made cheap, or free, safe, accessible, attractive and comfortable and a policy of education has been substituted for notification and quarantine.

In any plan of attack the greatest emphasis must be placed upon early diagnosis and early, intensive treatment if the most satisfactory results are to be gained. Some authorities are now recommending that individuals who have been exposed to the possibility of a syphilitic infection should be given a dose of arsphenamine as a mere safety precaution during the incubation period and soon after the exposure.

Sachs, in view of the fact that malaria treatment promises to be so effective in general paresis, suggests the advisability of treating with malaria in addition to the other most approved anti-syphilitic therapeutics, every patient who has had constitutional syphilis and who shows signs of mental disturbance.

The opinion of experienced men is unanimous on the point that curability of syphilis is greatly favored by vigorous treatment during the primary stage.

Chargin and Stone, of New York, studied 444 cases. They found that a probable cure was effected in 90 per cent. of the 36 cases who came under treatment in the chancre stage. Only 61 per cent. of probable cures were obtained in the 322 cases who first had treatment in the early secondary stage, while the probable cures in the 86 cases that first came under treatment with late secondary lesions fell to 45 per cent.

Warthin declares that he has never seen a case of "cured" syphilis, even after modern treatment, in which he could not find evidence of the survival of the process and even the organism itself at autopsy. His belief is that treatment simply reduces the disease to premature latency and that the subject maintains that latency at the price of his tissue reserve.

Stokes points out, however, that a single injection of arsphenamine will, in an overwhelming majority of cases, render the patient non-infectious within 24 hours and that repeated applications will hold the disease at a non-infectious latency for years, if not for life. From a public health and a public welfare point of view, this fact is ample justification for a most vigorous program based upon the treatment of infected individuals.

The foregoing makes clear the existence and character of the problem. It offers a proven method for solving the problem. A practicable means of applying the remedy in a satisfactory way is the only remaining essential factor which requires consideration.

Surveys conducted in representative territory all over the U. S. indicates that syphilis is rather evenly distributed everywhere in this country. Close to 5 per cent. of the population are affected. This indicates that the general practitioner who fails to find at least one case of syphilis out of every 50 patients handled is allowing this disease to escape his notice.

It is estimated on reliable grounds that 25 per cent. of the physicians in the country at large are treating 90 per cent. of the venereal disease patients. A very careful study showed that in St. Louis 10 per cent. of the physicians were treating 60 per cent. of the patients. This trend toward spontaneous specialism is an indictment against the general practitioner. A demand for specialists arises only when confidence is lost in the general practitioner. When confidence is lost there is usually a reason and that reason in

this case is either failure to recognize cases or too little knowledge about treatment.

Pointing out that the venereal disease program has become highly socialized everywhere, except in France and America, Stokes declares that in this field the individual practitioner is now on trial as he is nowhere else in medicine and nowhere is his dominion harder pressed or more gravely threatened. A book on syphilis, he reminds us, does very well if 10,000 copies are sold in four years.

I believe that the most effective way of reaching the general practitioner in Illinois is through the county medical society. A program on syphilis at least once a year is not too often. From the State Department of Health and from the medical staffs of the State hospitals is available splendid talent exceptionally able to discuss syphilis from every standpoint. Occasionally specialists from the U. S. Public Health Service are available. Men, like Stokes, Hazen and Stillians, may be had at some expense when it is desirable to attract large audiences of medical men.

I wish to commend these suggestions to your very serious consideration.

REFERENCES

1. Journal of Social Hygiene.
2. Archives of Dermatology and Syphilology, August, 1930.
3. Recent advances in Preventive Medicine. (Haslam.)
4. Venereal Disease Information, 1929 and 1930 issues.
5. Preventive Medicine. (New York Academy of Medicine.)
6. Statistical reports of the Illinois Departmpent of Public Health.
7. Statistical reports of the U. S. Public Health Service.
8. Annals of Internal Medicine, October, 1930.

DISCUSSION

Dr. W. H. Smith, Benton: I would like to emphasize the three main points made by Dr. Hall. First, early diagnosis; why wait for the Wassermann or Kahn test? Why not make a dark field examination? Then, early and persistent treatment; it is not enough that a man or woman infected with syphilis have three or four shots of medicine. Persistence is what counts. One negative Wassermann or Kahn is not sufficient, it is much better to have three or four or five negative reports to be sure your patient is cured. And finally, preventive prophylaxis should be taught to our young people. That, I believe, is the most important thing of all.

Dr. W. D. Chapman, Silvis: I wish to commend the speaker upon the importance of the subject he has chosen. While he was reading it, I was struck with the mention of malaria treatment in paresis. It seems to me it would be very bad public health policy to spread malaria over Illinois any more than is necessary. Paresis is not contagious and malaria is. I know of no more likely way of re-introducing malaria into Illinois than by using it in the treatment of paresis. It is very difficult to eradicate. In this connection I would like to refer to an article by Dr. Charles Read which appeared in the January issue of ILLINOIS MEDICAL JOURNAL, describing the use of sulphur and reporting on the results. Sulphur produces a fever. It would seem a much safer procedure than the use of malaria.

So far as free treatment is concerned, I am of the opinion that the American public is not the gainer if the general practitioner is eliminated. I was amazed at reading in a lay magazine of a Chicago institute that treats syphilis, the report of which stated that treatment is made available to the patient at a rate he could pay. They are treating patients for an average of $168 a year, and it struck me that Chicago is filled with general practitioners, good and competent men, who would be delighted to have one hundred cases of syphilis under care at $168 a year. There is certainly something wrong with the figures here. I think the medical societies are the proper places for discussions of this sort.

Dr. J. H. Bacon, Peoria: I have listened with interest to Dr. Hall's statements regarding the effectiveness of treatment. I have seen a woman with a twin pregnancy, who aborted one twin at two months. She had not had treatment previously, and is now going to term with the other twin, under treatment. It is rather unusual to have one twin destroyed and the other go on. This was evidently a case in which there were two placentas.

Dr. R. O. Stites, Industry: I wish to commend the public health measures advocated by Dr. Hall, and I believe his suggestions are excellent. If our county medical societies would discuss the common issues instead of the uncommon, that would be a good thought for all to take home.

Dr. W. H. Smith, Benton: May I have the floor again to correct the impression Dr. Chapman appears to have. He did not understand Dr. Hall's remarks, apparently. Dr. Hall made a statement that someone had advocated malaria treatment; I did not gather the impression that Dr. Hall advocates it, nor that he advocates free treatment. The medicine is furnished free to the doctors, and I do not know that any doctor would object to receiving it free as they do antitoxin.

Dr. Andy Hall, Springfield (closing): The statements I made concerning free treatment had reference to what was being done in England and Germany, where they furnish free treatment to a large number of people. The statement concerning malaria was this—that Sachs, in view of the fact that malaria treatment promises to be so effective in general paresis, suggests the advisability of treating with malaria in addition to the other most approved antisyphilitic therapeutics, every patient who has had constitutional syphilis and who shows signs of mental disturbance. That is being done with paretics and some very encouraging reports are sent in. It is presumed that you clean up the malaria infection before you

turn the patient loose. I do not think anyone would advocate giving malaria to every case of syphilis that comes to his office and let him go free to roam about the country.

I wish to emphasize to the secretaries of the county medical societies the importance of this subject and the importance of giving it a prominent place on their programs.

SYPHILIS OF THE NERVOUS SYSTEM*

ALEXANDER B. MAGNUS, M. D.,
Medical Director, Chicago Sanitarium
CHICAGO

There is probably no subject in the annals of medicine which has enjoyed such widespread attention by investigators as that of syphilis. The time allotted for presentation scarcely will suffice for even a glimpse at the one phase of it —neuro-syphilis.

It is now well established that syphilis is an infectious disease, caused by the spirocheta pallida, and that the nervous system is merely one of the goals of that bacterial invasion. Of all infectious diseases of the cerebro-spinal axis, syphilis is the most important. It affects the nerves, the meninges, the parenchyma of the brain and cord, and the blood vessels supplying these parts. The changes are either inflammatory, degenerating, or both. Tissues of mesodermal origin undergo inflammatory changes, while those of ectodermal origin undergo degenerative changes.

Embryologically the meninges are derived from the mesoderm and histophysiologically differ in no wise from mesodermal tissue elsewhere in the body. Tissues of such fabric have, if invaded by microorganisms or their metabolic end-products or by any other foreign element capable of irritating these, a more or less well-defined response, clinically designated as a reaction to inflammation. Thus an influx of lymphocytes, or phagocytosis, seems to be the main factor in the resistance shown, and success or failure will depend naturally upon the potentiality of the rising tide in defense of the host invaded.

As for the brain substance proper, the difference is striking indeed; embryologically it is of ectodermal origin; histologically it presents a multitude of neurones held together by glial tissue. Pathogenic insult here results in a true degeneration of the neuronic elements with probably very little power of resistance. The only possible reaction to any process of degeneration of nerve elements (leaving the myelin out of consideration) is possessed by the glial tissue. The reaction of the glia to myelin degeneration is especially prominent by the formation of large or small ameboid forms.[1] Unfortunately the power of the glial tissue is very limited and inadequate as a factor of defense, with the result that it itself undergoes extensive proliferation. Thus the invader's aggressiveness unhindered goes on probably because of the absence of the type of reaction so inimical to systemic welfare. These changes are usually manifested several years after acquiring the disease, but they are observed even in the first year after infection.

The signs and symptoms will naturally depend upon the extent and type of tissue involved, and also the time of their manifestations. When the invasion is diffuse it is sometimes difficult to circumscribe a clearcut clinical entity. But there are those cases wherein a fairly limited region has been so predominantly affected as to characterize the clinical picture. Moore,[2] of Baltimore, reports a group of cases both early and late in the course of syphilitic infection, where asyptomatic neuro-syphilis is of common occurrence. The findings were reported on the basis of changes in the spinal fluid in patients with primary and secondary syphilis.

Mental symptoms are not infrequent in cerebro-spinal syphilis, which, according to Henschen,[3] are said to occur in 18 per cent. of syphilitic patients. Syphilis, furthermore, predisposes to arteriosclerosis and in a more indirect and entirely psychological way, the knowledge of syphilitic infection may result in a psychosis. It may also act before birth or at an early age in the offspring as a result of syphilis inherited from the parent, and result in a progressive intellectual deterioration, very much like the course described later in an acquired adult paretic. Occasionally one elicits a sudden mental explosion immediately following the first intravenous arsenical introduction.

The cases that come to our attention are nearly all pretty well along in their development and as a rule offer no difficulty of recognition. The past history is looked into and

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syphilis is never lost sight of; the patients are studied clinically and serologically. Two main types are recognized; 1, paresis, tabes or tabo-paresis; 2, meningo-vascular syphilis. A third type, cerebral lues, is often alluded to by certain investigators whenever any of the cranial nerves are involved only.

General paralysis of the insane or paresis is by far the most frequent of the syphilitic psychoses. The symptoms may be divided into: 1, the prodromal stage; 2, the stage of full development; and, 3, the terminal stage.

The Prodromal Stage. Diagnosis is not always easy, but very essential when so many unfortunate and embarrassing acts could be avoided by prompt commitment to an institution. The early signs are usually so indefinite, and of such slight degree that no particular significance is attached to them. An adult or middle-aged person, who has not previously been neurotic, will appear with probably only a neurasthenic complaint, such as easy fatigability, rheumatic pains, dizziness, insomnia, etc., or he may be possessed of a morbid fear of impending danger and show irritability or bad temper, lack of power of concentration, and he may become moody. Some are even able to realize that they are not quite so clearheaded and so competent as they used to be; they know that they are forgetful and that they make mistakes in the simplest tasks. Soon, however, more significant symptoms appear, such as evidence of defective intelligence. A previously sober and moral individual will indulge excessively in drinking and associate with lewd women, oftentimes openly without shame. The anti-social or immoral individual, on the other hand, may turn out to be an ardent reformer. The personality change is very characteristic. The picture in short is one of organic dementia. Upon it may be engrafted various coloring of either maniacal excitement or depression, delusions of grandeur and delirium. These subservient attributes in themselves are of no diagnostic value. The transitory and shifting character of all symptoms and signs should always lead one to suspect lues.

The physical signs usually present consist of oculo-motor and light reflex disturbances. The pupils may be irregular, unequal, either sluggish or fail to react to light, directly or consensually. The pupils may not dilate on stimulating the skin of the neck or by mental exertion. The knee jerks are over-active, while in tabo-paresis they are diminished or abolished. The tongue protrudes hesitatingly and shows a tremor. There is beginning slurring of speech and the hand-writing is analogous to the slurring. In doubtful cases the Muck Adrenalin or Mucographic test is made use of. The inferior turbinate is rendered ischemic by the application of a 1:1000 adrenalin solution. A linear scratch is then made parallel to the floor of the nose with a probe under moderate pressure. In cases of neuro-syphilis the lines appear hyperemic on an ischemic background and stand out quite white when the turbinates become hyperemic again.

In the state of full development the mental and physical symptoms and signs are merely more exaggerated expressions of those described in the prodromal stage. Memory fails utterly. Dementia is more pronounced. Excitement, depression or grandiose symptoms appear more prominent. Paretic seizures are conspicuous; they may be of the petit or grand mal type. The naso-labial folds seem wiped out. The voice lacks expression and words are stumbled over.

The Terminal Stage. Orientation is lost in all spheres. The patient leads a vegetative existence more than a mental life. The seizures are more frequent and there is loss of sphincter control. Death takes place during a seizure, from bed sores, or other complications. Serologically—The blood Wassermann is usually positive; occasionally it is negative. Negative blood Wassermann of treated or untreated cases does not rule out cerebro-spinal lues. The spinal fluid study is, therefore, of great importance. Syphilitics, as a rule, have no post-puncture headache. Sometimes the mere withdrawal of fluid will cause the symptoms to subside. The cells counted by the Fuchs-Rosenthal method immediately following the puncture usually will vary from 10 to 100 per cmm. The globulin test is positive; the Wassermann reaction is positive in nearly all cases, especially with larger dilutions. Another aid is the gold sol test. While a diagnosis of lues on the curve alone cannot be made, syphilis, if otherwise diagnosed, the various curves produced by the color changes serve to differentiate the type of syphilis

present. Three curves are recognized: paretic, meningeal and luetic.

Meningo-vascular syphilis differs from paresis in that the former term is used to designate involvement of the arteries of the nervous system together with the meninges, particularly the pia-arachnoid. The disease manifests itself early usually within the first and second year after infection. When the vessels are primarily involved paralytic symptoms from thrombosis or hemorrhage dominate the picture. Any of the cranial nerves may become involved, more commonly the optic, oculo-motor and abducens. A fixed rather than an Argyll-Robertson pupil is diagnostic. Choked discs are sometimes met with, as well as general symptoms of gummatous meningitis. Neuralgia, hyperesthesia, anesthesia accompany trigeminal nerve involvement. Headache, acute exacerbations, rigidity of neck and pains along the roots testify to the presence of meningitis. The meningitis is usually basilar in type. Polyuria and glycosuria are not infrequent. Mentally there may be irritability, restlessness and anxiety, or a state of lethargy. Serologically, the Wassermann reaction is more commonly positive in the blood than in the fluid. The cell count may run into hundreds and even higher when the involvement is more meningitic and the gold sol curve is in the meningeal zone.

Spinal Cord Syphilis. Convincing proof to explain the seemingly selective regional distribution of syphilitic pathology in the brain in different individuals is still lacking. Some ascribe it to a peculiar predilection or affinity of the spirocheta or perhaps certain strains of the same; while others maintain that there is an innate susceptibility or possibly a lowered resistance of certain of the brain tissues, that succumb to the scourge of the bacterial onslaught. Be that as it may, the same principle is equally applicable to the cord. Almost any column or combination of tracts may be involved, precipitating any of the known spinal diseases. Locomotor ataxia only will be mentioned. The process begins with the dorsal roots ganglia, causing sharp shooting pains which are often mistaken for rheumatism. It next ascends to the posterior columns of Gall and Burdach reaching up ultimately to the higher cerebral territory where it shows a special predilection for the 2nd, 3rd, 4th and 6th cranial nerves. Sensory symptoms predominate. Girdling sensations are felt encircling the chest or abdomen. The patient feels as if he were walking on carpet. The knees and ankle reflexes are diminished or abolished. The Romberg sign is positive. Superficial and deep sensations are lost. The gait is ataxic. Charcot's joint is relatively more common in the female than in the male. Mentally the tabetic shows fair orientation and memory remains intact, save for those who progress to paresis. Krapelin describes a distinct psychosis in tabes, manifested by acute hallucinatory excitement. The disease does not kill. The spinal fluid shows slight increase in the cells and the globulin is faintly positive. The Wassermann reaction is mostly always positive.

The treatment of neuro-syphilis is in no degree less in wealth of approach at solution than that enjoyed by syphilis itself. Notwithstanding the timidity of many neuro-psychiatrists, probably so sensitized because of past repeated failures, who prefer the word "remission" for cure, my experience and observations tempt me to a prodromal feeling of saying "cure" for remission. This may be accomplished by subjecting the patient to a course of twelve body temperature rises on alternating days, followed by eight intravenous tryparsamide injections of 3 grams each at weekly intervals. Mercury salicylate, grain 1, is used three days before the tryparsamide injection intramuscularly. The malarial inoculation used for body temperature elevations, preferred by many, was described by Wagner Jauregg in 1918.[4] There have been a number of fever producing agents described since and some mentioned even before. The methods tried at the Sanitarium were: Intra-spinal therapy,[5] typhoid-paratyphoid, malaria, sulphur in oil, and the electric blanket application used now by Dr. S. D. Wilgus at the Elgin State Hospital. Each form has merits and disadvantages. Time limit does not permit of a comparative review of the different methods used. For a detailed description of the malarial method I would refer you to an article by Dr. Bassoe in the ILLINOIS MEDICAL JOURNAL for August, 1926.

The blanket method briefly consists of wrapping the patient in a well-padded and waterproofed electric blanket covered freely by more blankets to retain the heat. A current of 2½

to 5 amperes is then turned on and allowed to pass until the mouth temperature registers 102-8 degrees Fahrenheit and then turned off. The body temperature continues rising until it reaches 106 and even higher and is made to decline at will by unwrapping the patient. Water is given freely and after the fever subsides, the patient sinks into a deep sleep. Extreme care must be exercised in order to prevent burns which are seldom more than of a second degree type and generally appear at the heels. Liberal wrapping of the feet in blankets will prevent such burns.

Results: Clinically gratifying results are usually observed, and if there is no previous long-standing deterioration, improvement of the mental faculties will follow early, though sometimes they become apparent months after the termination of the treatment. The serology, too, may show late changes. In some cases the fluid is seen to clear a year after the initial course of treatment. The fever and tryparsamide combinations are often repeated two or three times. Cases that will clear mentally during the fever course may develop acute visual and auditory hallucinations with the beginning of the tryparsamide succession. These symptoms are of transient nature and should not deter the clinician from the outlined course of therapeutic procedure. Dimness of vision, and even blindness, are sometimes met with in cases of pre-existing optic atrophy following the use of tryparsamide, but in many there is an evident escape from the blindness. In the well-defined second and terminal stages the results are not so encouraging. However, no matter how hopeless a case may seem, some improvement will invariably follow. Whether such improvement in far advanced or terminal cases will have any material bearing upon the ultimate fate or not, is not yet certain. In the meantime, however, a palpable economic advantage as well as a wholesome satisfaction to everybody concerned in and out of the institution is striking. Among the reported non-yielding cases to any form of therapy are doubtless many of the dementia praecox group, who, during their useful life were certainly no less liable to infection than the non-potentially psychotic individual. As yet the bulk of the dementia praecox cases respond to no form of treatment.

There are countless numbers of cells and processes that go to make up the brain substances, and success or failure will depend largely upon the number of cells destroyed. A brain cell once destroyed is never replaced. The fever treatment will at best go to arrest the process of degeneration, and if a sufficient number of intact neurons is left, the individual may continue thriving as efficiently as before, and in some instances even better; moreover, it would seem that many of our fellowmen function on so few neurones anyway. In frontal lobe tumors, for instance, large areas are often excised *en masse* without any consequent psychic alterations. A kidney removed, the one left will function and compensate for the one lost, etc. If the patient's ability to adjust himself to the environment is once restored and maintained reasonably long enough, along with negative laboratory findings, cure is certain and its pronouncement justifiable.

In closing I wish to say that no arsenical preparations other than the one mentioned above is used in our cases. There is ample clinical and laboratory evidence to show that most heavy metals do not reach the brain at all, and again Gennerich's[6] version is timely when he says. "The more generalized the infection with the organism, the greater the production of immune bodies and hence the greater the probability of resisting the infection. When most but not all organisms are killed by arsphenamine and the natural immunity thereby reduced, there is danger of greater growth of the organisms unhindered by specific anti-bodies." Wechsler[7] and others maintain that it is just those who have been vigorously treated that are most apt to develop paresis or tabo-paresis. The arsenica's, in moderate doses are, of course, of undisputed value in vascular syphilis and likewise in meningo-vascular syphilis, where almost any form of anti-luetic treatment will yield gratifying results. I believe potential neuro-syphilitic cases should be treated during their primary and secondary stages in the same manner as a case going into progression.

REFERENCES

1. Buzzard & Greenfield: Pathology of Nervous Diseases.
2. J. E. Moore: Asymptomatic Neurosyphilis. Arch. Derm. & Syph., July, 1928.
3. Quoted by Henderson & Gillespie. Textbook of Psychiatry.

4. Wagner-Jauregg: Nervous and Mental Diseases. Bassoe 1929.
5. A. B. Magnus: Intraspinal Treatment of Neurosyphilis. Wis. Med. Jour., Nov., 1924.
6. Gennerich: Quoted by Jacobs. Arch. Neurol. & Psychiatry, Apr., 1923.
7. I. S. Wechsler: Clinical Neurology, 1930.

DISCUSSION

Dr. Loren W. Avery: I think the last ten years has probably developed more knowledge concerning paresis than any other form of syphilis. I am glad that Dr. Magnus pointed out that there are mental changes in other forms of syphilis besides paresis. There seems to be a tendency at times to diagnose paresis in practically every case of lues with beginning mental change. Mental changes certainly occur in vascular conditions and may occur in that particular blood vessel syphilis, endarteritis, in which the patient has epileptiform attacks.

Mental changes may be of more than one type. Clinically, it may seem that the diagnosis of early paresis is difficult. It may be that it is more a pathological entity than a clinical one. Some cases treated apparently showed all the signs of paresis and they got well, but they may not have been paresis but spinal or meningeal syphilis. The mental changes of cerebrospinal syphilis are due to scattered foci of infection. Apparently, the brain can stand more if it is spotty instead of generalized.

It is rather striking that the histopathology of paresis really does not look much like syphilis in itself. Changes in the paretic patient are more sclerotic. Just what paresis is and how it comes about is still a very open question. The theory that paresis develops as a non-specific or non-luetic reaction to the spirochete is interesting.

The treatment of paresis seems to be advancing rapidly. The fever therapy certainly has its place in the treatment of this condition. There is no conformity of opinion as to what fever therapy does. Some German authors have described a reversion where it appeared to them that the attack would revert to the meningeal vascular type of pathology, but some American investigators have not been able to accept that particular reversal of pathology. Tryparsamide has a definite place in the treatment of paresis. It may be that tryparsamide in some cases will not be as effective as the fever therapy. It is true that the fever therapy seems to be of great value.

As to the treatment of other types of syphilis than neuro-syphilis, it is interesting that salvarsan seems to enjoy no popularity in the treatment of paresis and it does seem clinically that those cases that have received considerable salvarsan offer a bad prognosis. That may not be due to salvarsan entirely, of course. In those cases of syphilis that will go on to paresis in spite of all treatment, salvarsan is not of much value and nothing can touch them.

I should like to make a plea for the milder forms of treatment of syphilis. If we have learned anything in the last ten years, it is the importance of giving these patients long periods of rest, and to treat them only to the point where they feel bodily well. It is entirely possible to over-treat them and cause them to feel less well.

CORONARY THROMBOSIS*

WALTER S. PRIEST, M. D.
CHICAGO

The recognition of coronary thrombosis as a clinical entity and its differential diagnosis from angina pectoris and other conditions has resulted in a great measure from the observations of American clinicians during the past fifteen years. Prior to 1910 occlusion of the coronary arteries was observed at the autopsy table but only occasionally was the possibility of the ante-mortem recognition of the condition mentioned. To a member of this Society, Dr. James B. Herrick, belongs the credit for arousing the interest of the American medical profession in this not uncommon accident of middle and later life. Since his first paper in 1912[1] and the subsequent ones[2 3 4] a few years later a considerable literature has accumulated on the subject with the result that the symptoms and signs have become definitely established. In the majority of instances its recognition is not difficult if the possibility will only be borne in mind. Considerable has also been learned about complications and prognosis and certain lines of treatment established. But many more years of observation of acute cases and careful follow up of those that recover will be necessary before all of the possible data concerning these latter points can be accumulated.

In the course of an investigation of one phase of the subject during the past 4 years it has been my opportunity to study the case records of approximately 70 patients with undoubted coronary occlusion. Sixty of these form the basis of this paper. Some of these patients were personally observed, others were private and ward patients of the attending Staffs of Michael Reese and Chicago Memorial Hospitals. For the cooperation of these colleagues I am greatly indebted. A consideration of the data furnished by this fairly large group of patients may serve to emphasize certain points in the clinical pic-

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ture. The typical course of the acute attack and the immediate result is illustrated by the following case reports selected from this series.

Case 1. Male, aged 50 yrs. Hypertension 15 years, anginal attacks 5 years. Family history of angina. Awakened at three o'clock in the morning by sense of intense pressume beneath the sternum radiating to both arms but more so to the left. Pulse 130. B. P. 136-126. Pale cyanosis, cold sweat. More comfortable sitting up. Temp. 100°. Not relieved by amyl nitrite, and only partially relieved by repeated injections of morphine. Brought to the hospital about 7 A. M. at which time W. B. C. was 13,800. During the day he continued to have more or less pain which was difficult to relieve. At 7 P. M. paroxysms of coughing developed associated with dyspnea. About this time a precordial friction rub was heard. At 7:35 he was dazed and dizzy, pulse weak, 140. At 8 P. M. the pulse suddenly dropped to 88, at 8:30 he died.

Case 2. Male, aged 60 years, suddenly seized with severe substernal pain at 9 A. M. which was continuous until 6 P. M. at which time morphine sulphate gr. ½ was given. Temperature at that time was 100.3°, B. P. 144/84 (it had been known to be much higher for sometime) W. B. C. 13,100. Admitted to the hospital the same day. Twelve days after the attack a precordial friction rub was heard. He did very well and was thought to be making a satisfactory recovery when on the sixteenth day he experienced sudden severe substernal pain, became pale, clammy, pulseless, vomited and was dead thirty minutes later. Autopsy showed a thrombosis of the intermediate branch of the left circumflex artery, an infarct of the posterior surface of the left ventricle, marked sclerosis with narrowing of the right coronary and a recent right pulmonary infarct.

Case 3. Male, aged 54 years. Previous history of hypertension. Family history of angina. Sense of tightness in the chest 18 hours gradually increasing in severity. Relieved only by morphine. Associated with fall in B. P. to 120/80, temperature 100.4° and pulse 120. Admitted to hospital forty-two hours after onset at which time temperature was 100.8°. W. B. C. 16,100. His course was complicated by pulmonary infarcation of the right base. Friction rub was heard 17 days after onset. Remained in bed four weeks, then underwent a slow, careful convalescence at home. Alive today a year and nine months later. Active, i. e. able to carry on his work as an architect, and is free from any anginal symptoms. B. P. has ranged from 80/55 at time of discharge to 120/80.

Tabulating the outstanding points of the above cases we have a middle age patient, a previous history of angina or hypertension, sudden onset of substernal distress of varying intensity lasting several hours, not relieved by nitrites, relieved only by large doses of morphine, pale cyanosis, cold sweat, weak rapid pulse, a falling blood pressure, slight fever, moderate leucocytosis, prostration of varying degree, precordial friction rub.

While a family history of angina and a previous history of hypertension are common, many patients are observed without the familial history and a few without preexisting hypertension. The attack is just as apt to occur during rest or sleep as following exertion. The severity of the pain varies from that which is so intense as to cause the patient to thrash about the bed or pace the floor to that which is no more than a nagging discomfort which does not force him to seek medical attention until some hours after the onset. The duration of the pain, if unrelieved by opiates, also varies. While it usually persists until so relieved it may cease spontaneously after thirty minutes to an hour or so, or after being intense for this period subside to a dull aching discomfort. The important point is that it lasts longer than the few minutes characteristic of an attack of angina pectoris. While a precordial friction rub was heard at some time in each of these three instances this finding is by no means constant and while very helpful is not necessary to the diagnosis. It is apt to be evanescent when it does occur, being heard by one observer but absent when the patient is examined again a few hours later. Naturally it is only when the myocardial infarction is in that part of the heart beneath the anterior chest wall that a rub may develop and even then the infarct must extend to the pericardial surface. The other points mentioned are essential to the diagnosis of acute coronary thrombosis. If the temperature is taken by mouth, especially in the early part of the attack, a slight elevation may be missed. Therefore rectal temperatures should always be taken.

The fate of these three patients typifies the three general groups into which the subsequent course may be divided, namely: 1. that in which the heart is unable to withstand the insult and fails rapidly over a period of hours. Occasionally the failure is more gradual and extends over a period of days but it is always unmistakably downhill in spite of treatment. 2. That in which there is every indication of recovery but which terminates in sudden exitus usually about the second or third week. The cause of death is either rupture of the heart at the site of infarction, thrombosis of a branch of the opposite cor-

onary, or temporary occlusion of an already sclerosed and narrowed coronary on the opposite side. Dr. Otto Saphir, Pathologist of the Michael Reese Hospital is of the opinion that if one coronary, for example the left, has been occluded, subsequent occlusion of the opposite coronary (or the right in this case) results in instant or almost instant death. We have been able to demonstrate this experimentally on the dog in some work done four years ago. By a suitable method we were able to occlude either or both coronaries at will after the animal had recovered from the necessary surgical procedure. Occlusion of either vessel alone could be maintained indefinitely. But, if while occlusion of one vessel was in progress, the opposite one was occluded ventricular fibrillation occurred almost at once and the heart stopped within sixty to ninety seconds. This lends support to the belief held for some time that sudden cardiac death, in absence of rupture, is due to fibrillation of the ventricles. It also explains the sudden death of patients several months after recovery from thrombosis of a coronary vessel. We have seen a number of times at the post mortem table old thrombi with healed infarcts in one side of the heart and a fresh thrombus with acute infarction of the other side or a very marked narrowing which could easily suffer temporary occlusion from spasm. And we feel convinced that the above premises explains many of the sudden deaths in people who are going about their daily work. 3. The third group comprises those who recover and live for varying periods of time. One may subdivide this group into those who get along with little or no discomfort, and those whose activity is more or less restricted because of anginal attacks or chronic decompensation. The patients who have little or no discomfort will usually be found to have low blood pressures as compared with their previous hypertension. Of the 29 patients reported here as still living 18 have average blood pressures lower than before the attack. They are all active and report little or no distress. Three have low pressures but are in poor condition. Seven whose pressures are as high or higher than before the attack have angina of varying severity.

Differential Diagnosis. The typical case presents no great difficulty if the possibility will be borne in mind. Angina pectoris is ruled out by the duration of the pain, failure of nitrite to relieve pain, the fall instead of rise in blood-pressure, fever, leucocytosis, weak rapid pulse, shock, collapse, irregularities of the pulse, pulmonary edema, pericarditis, gastric symptoms, and evidence of embolism elsewhere in the body. The error in diagnosis most disastrous to the patient lies in mistaking coronary thrombosis for an acute surgical lesion in the upper abdomen. The most astute clinicians have made this mistake in the past and have seen these patients operated on only to die on the table and have the pathologist find the lesion in the heart. That the mistake is an easy one to make can readily be appreciated when we consider the not uncommon epigastric distress, nausea and vomiting, the fever and leucocytosis, the occasional icteric tint and rigidity of the abdomen which accompany coronary thrombosis. As more attention is called to the possibility and as we become more insistent on a painstaking examination of the heart of every patient past middle life with upper abdominal symptoms and as we go more minutely into the histories of these patients the less will the mistake be made.

Other observers, particularly Levine,[5] have called attention to frequency of diabetes in patients with coronary thrombosis, and to the not infrequent occurrence of transitory glycosuria. While this association was almost nil in our series the presence of shock, stupor, glycosuria and even depressed carbon dioxide combining power does not exclude the possibility of an acute coronary accident.

Occasionally pneumonia may be diagnosed because of the pain, cough, rales, dyspnea, fever and leucocytosis and friction rub. But in pneumonia the pain is lateral rather than substernal, the temperature and leucocytosis rise within a few hours to much higher levels and other characteristic signs develop.

Occasionally the symptoms attending coronary thrombosis may be so mild as to pass almost unnoticed. One patient in this series came to the Dispensary several months after what she thought was an attack of "flu," for which she had remained in bed a short time. She had had hypertension for several years. A careful review of her previous record and the details of the attack of "flu" together with the electrocardiogram left little room for doubt that instead of "flu"

she had really had coronary thrombosis.

Rarely there may be no pain associated with the attack, only sudden syncope and dyspnea. Here again, careful consideration of the past history and other features of the attack together with laboratory examinations will be necessary to establish the diagnosis.

Prognosis. Prognosis in any case must be guarded. One must be content with saying that the patient has an even chance of surviving the immediate attack. While in this series only 15% died within a few hours to 16 days, Levine reports 53% as having failed to survive the acute attack. There are 10 or 20% of those whose subsequent course is known who died after recovering from the initial attack. The average duration of life of these was 10 months, the longest five years. All but three dropped dead suddenly. Those who are known to be alive have survived from two months to a little over four years with an average of 1.7 years. The average age of those who died during the acute attack was 53.5 years, of those who survived the acute attack, but have since died 58; of those known to be alive 54.1. The average age of the entire group was 55.5. It would seem that the prognosis is slightly better the younger the patient. While the incidence in women was low, the mortality rate was high. Sixty per cent died and all but one of these during the initial attack.

Treatment. Absolute rest is the most important therapeutic measure at present available. The patient must be spared every effort. Free and easy bowel movement must be secured after the first 24-36 hours. Visitors and all forms of excitement must be excluded. For the relief of pain large doses of morphine are necessary. These patients apparently tolerate morphine well and it has become our practice to give a half grain hypodermically as the first dose and subsequent doses sufficient to secure continued relief and quiet. So long as the circulation is able to carry on at all stimulation is inadvisable even though shock be profound. During the first 24 hours if the blood pressure remains below 100, or the pulse remains practically imperceptible for any length of time caffeine sodium benzoate in large doses, adrenalin or intravenous strophanthin are used. After this stimulation is seldom necessary and is attended with considerable danger. With the exception of complete heart block associated with syncope or ventricular tachycardia which persists, the irregularities in rhythm such as auricular fibrillation and flutter, extrasystoles paroxymal auricular tachycardia which frequently develop do not need treatment. For the former hypodermic injections of adrenalin are usually sufficient, or barium chloride may be used if the attacks are frequent. For the latter quinidin sulphate is almost specific. Huge doses are sometimes necessary. Levine reports one instance in which 1.5 grams were given five times a day before the desired restoration of normal mechanism was obtained. This author also suggests some helpful criteria by which this irregularity may be recognized at the bedside. The rate suddenly becomes rapid (150-200) but remains essentially regular. Careful and prolonged ausculation will however elicit an occasional slight pause. The rate is uninfluenced by vagal pressure. The intensity of the first tone at the apex may vary and a "sudden clicking, reduplication or snapping sound may be heard with various cycles." With the exception noted above we believe digitalis is contraindicated unless congestive heart failure develops. This will rarely occur until after the second week when the danger of rupture of the infarct has practically ceased and digitalis may then be given with comparative safety. In spite of the fact that many patients have recovered with a week or two rest in bed the period should be from six to eight weeks in every case, and resumption of physical activity be very gradual.

Electrocardiograms. The electrocardiogram has been of great assistance in the study of coronary thrombosis, and where the necessary instrument is available frequent records will be found both helpful and interesting. However, it is not absolutely necessary. In the great majority of instances the diagnosis can and should be made from the history, physical findings and leukocyte count. In the atypical case or the ones having associated conditions which complicate the picture, the electrocardiogram may be the deciding factor. It may at times give a clue as to the nature of a previous illness, the true cause of which was overlooked.

From time to time various abnormalities in the electrocardiogram have been pointed out as indicative of coronary thrombosis. There are inversion of the T wave, especially when associated

with upward rounded "cove" or "humped shaped" shoulders; high take-off of T from the descending limb of R; the reverse of this or a slow return of the string from S to the isoelectric line; elevation or depression of the ST interval; deep Q wave, especially in lead III; low amplitude of deflection of the QRS complex in all leads, and a small sharp notch in the isoelectric line at the base of R. Any one or more of these abnormalities may be present in the electrocardiogram of a patient with recent or previous coronary thrombosis. On the other hand, none of them may be found where there has been unmistakable thrombosis. Furthermore, one or more similar changes may be found in records of patients without history of findings indicative of thrombosis.

Looking at the record shown in Fig. 1, we would be tempted to make a diagnosis of coronary thrombosis without knowing anything

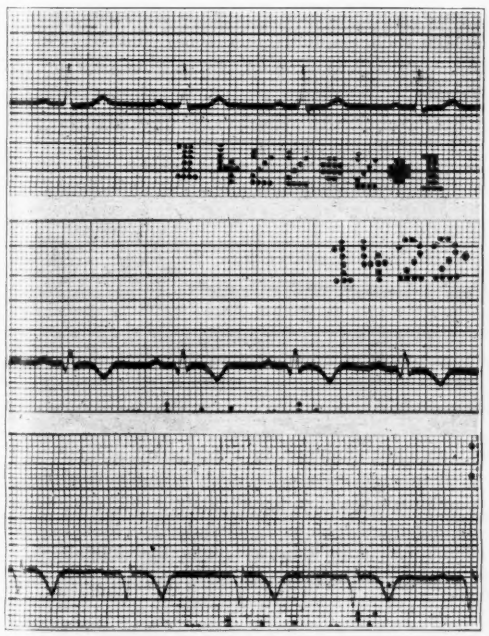

Fig. 1

about the patient. It has the inverted T in leads II and III, of typical form, deep Q and high take-off from R in lead III. In such a case, we would likely be correct as such a record is rarely, if ever, produced by anything else. Pericardial effusion is a possible exception. This record was made four weeks after thrombosis occurred.

Figure 2 is a record made eleven days after the third attack of thrombosis in nine weeks. It shows nothing which in itself is indicative of the

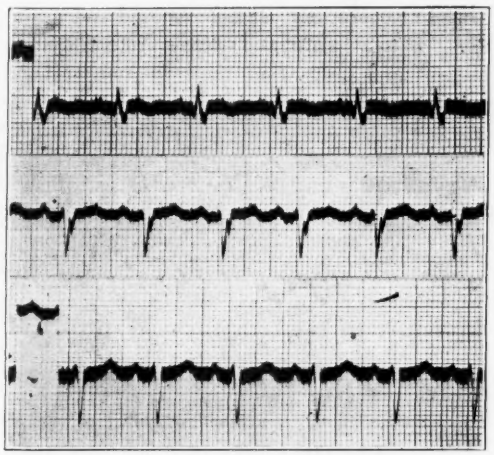

Fig. 2

condition. Figure 3-a is from a patient with coronary thrombosis showing low amplitude of QRS, depressed ST in lead I, inverted T with "cove" in leads II and III, deep Q and high take-off in lead III, and the sharp notch at the base of R in lead I. Figure 3-b is a record taken a few hours after thrombosis, showing the slow return to the isoelectric line and the notch at the base of R. Figure 3-c is from a dog after a few minutes occlusion of a coronary branch showing the slow return to the isoelectric line. The fourth strip is from lead III of another dog, showing deep Q and inverted T in lead III, a few minutes after occlusion. Figure 3-d is from a patient who did not have coronary thrombosis. Note the similar slow return to the isoelectric line.

Figure 3-e is the record made nine hours after onset of the acute attack, showing a modification of the slow return in leads I and II. This is commonly referred to as depression of the ST interval. Note also the deep Q and elevated ST in lead III.

Figure 3-f Record made four months after an attack diagnosed as "flu." Note the depressed and rounded ST and inverted T in leads I and II. This record together with the history of previous hypertension epigastric pain radiating to left shoulder, syncope, slight fever, drop in blood pressure, made the diagnosis of coro-

nary thrombosis rather than "flu" at least likely. Patient still alive.

Fig. 3-g. Record made thirty-six hours after onset of acute cholecystitis. Diagnosis confirmed at operation. Stones removed and drainage. Patient alive and well. Note the high take-off and deep Q in leads II and III and inverted T in lead III. It may be argued on the basis of the electrocardiogram that this patient really had acute coronary thrombosis. If so, it must have occurred simultaneously with the acute gall bladder attack, an unusual coincidence. Also it would be most unusual for such a patient to survive a major surgical operation under general anesthesia.

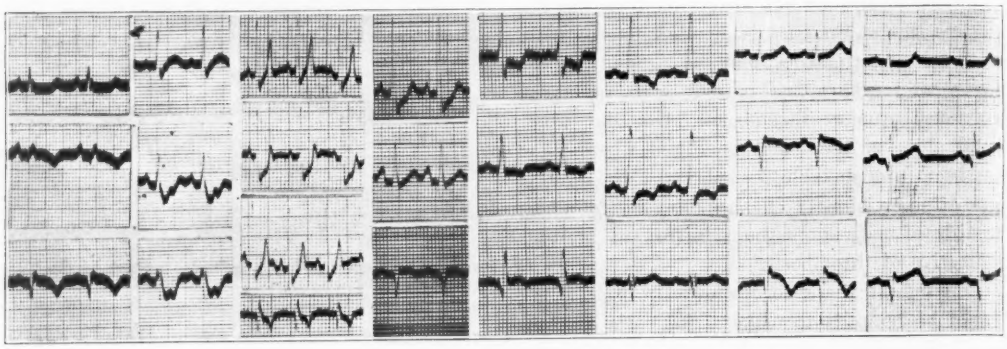

Fig. 3 a b c d e f g h

Fig. 3-h. Patient aged fifty-nine; no cardiac symptoms or complaints; no hypertension; routine electrocardiogram; arteriosclerosis with aortitis and diabetes. Note the depressed ST in lead I, elevated ST in lead II, deep Q and high take-off in lead III. Patient alive.

Fig. 4-a, b, c. Records from patients with luetic aortitis, showing various abnormalities, including inverted T in various leads, depressed and elevated ST, small notch at base of R. Patient b died suddenly. Autopsy showed aortitis and coronary sclerosis. No thrombosis or infarction.

Fig. 4-d, e, f. Records from patients with short anginal attacks without clinical history or findings of thrombosis showing various abnormalities including deep Q in lead I, depressed and elevated ST, inverted T. Patient f died of uremia. Autopsy showed coronary sclerosis but no thrombosis or infarction.

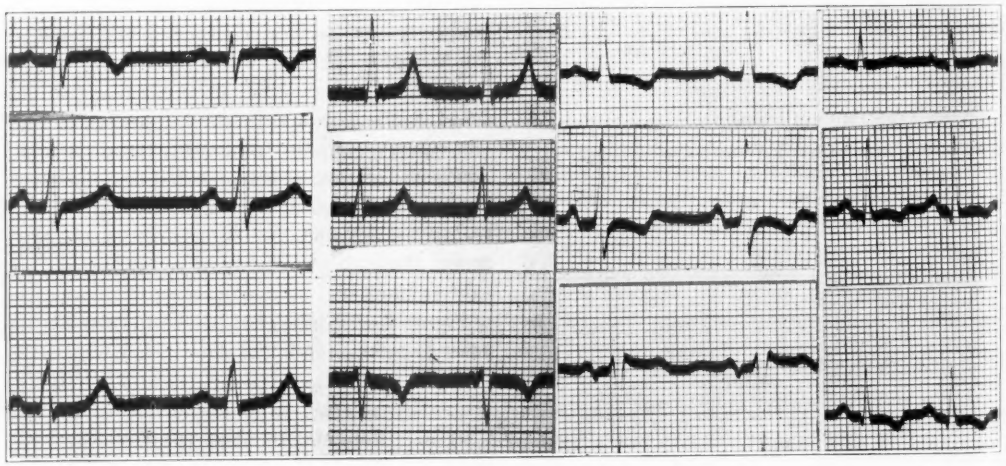

Fig. 4 a b c d

Fig. 4-g, h. Routine records of patients aged

forty-one and forty-nine without cardiac complaints. Both had hypertension. No history suggestive of previous coronary thrombosis. Abnormalities shown are deep Q in lead III, de-

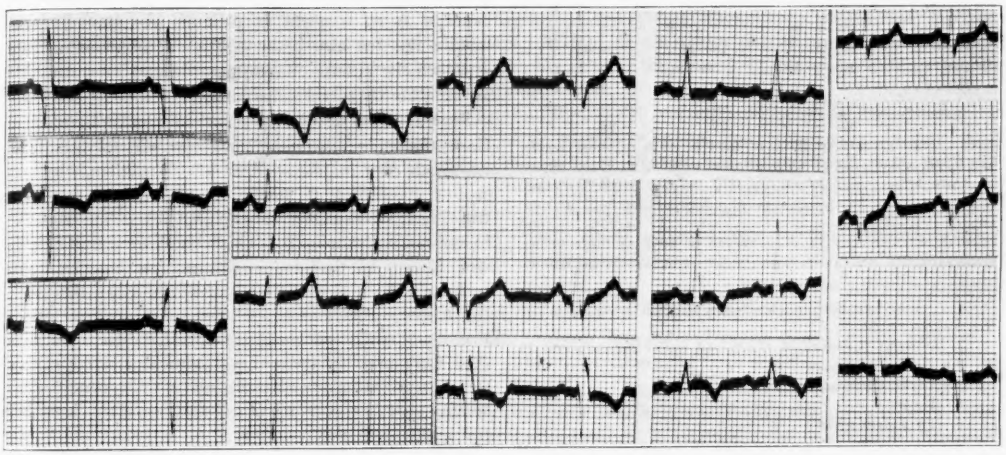

Fig. 4 e f g h i

pressed ST, fairly typical inverted T in leads II and III.

Fig. 4-i is included merely to illustrate the occurrence of deep Q in lead III in a child of four and a half years without heart disease.

Summarizing the above records, five illustrate the several variations observed following coronary thrombosis. The type of variation in a given record depends considerably on the time which has elapsed since the accident. One illustrates the possible absence of typical variations in spite of clear cut clinical evidence. Two (Fig. 3 g and 4 h) are records which one would be inclined to diagnose as indicating coronary thrombosis but in which the clinical evidence is lacking or doubtful. The others are included to show variations which while somewhat similar to, must not be confused with those of coronary thrombosis.

SUMMARY

Sixty records of patients with coronary thrombosis were analyzed. The youngest was 36, the oldest 80. Eighty-five per cent survived the acute attack; of these 10 lived an average of 10 months, the longest duration of life being five years. All died cardiac deaths, mostly sudden. The remainder so far as is known are still alive. The average age of those dying during the acute attack was 58, of those still alive 51. The outcome of the acute attack falls into three groups; death instantaneously or within a few hours; death within 14-16 days; recovery. Location and radiation of the pain has wide variations. Pain may not be present. Diabetes, thyrotoxicosis, valvular lesions, syphilis were rarely associated in this series. Aside from disturbances in cardiac mechanism the most frequent complication was pulmonary infarction.

BIBLIOGRAPHY

1. Herrick, J. B.: Clinical Features of Sudden Obstruction of the Coronary Arteries, J. A. M. A., 1912, lix, 2015.

2. Herrick, J. B.: Thrombosis of the Coronary Artery, Trans. Assoc. Am. Phys., May, 1918.

3. Herrick, J. B. and Nuzum, F. R.: Angina Pectoris: Clinical Experience in Two Hundred Cases, J. A. M. A., 1918, lxx, 67.

4. Herrick, J. B.: Thrombosis of the Coronary Arteries, J. A. M. A., 1919, lxxii, 387.

5. Levine, S. A. and Brown, C. L.: Coronary Thrombosis, Medicine, 1929, viii, 245.

Table 1—Age and sex incidence. Distribution as to decades. Subsequent fate. Ratio of males to females; comparative mortality as to decades and sex.

Table 2—Location and radiation of pain during the attack. Including only those patients from whom a sufficiently reliable history could be obtained. The prodromal weakness group includes patients who had undoubted attacks without pain.

Table 3—Associated conditions and complications arising during acute attack.

TABLE 1

Age

Average 55.5
Youngest 36 died first attack
Oldest 80 died first attack

Average age of those who died during first attack..... 58
Average age of those surviving first attack but since died 56.5

Average age of those alive 51.4
Average age of males 55.5
Average age of females 56.7

DECADES

		Alive	Dead
	No. %	No. %	No. %
35—40	3— 5	2— 7	1— 5.2
41—50	13—21.66	5—17.2	3—15.8
51—60	29—50	16—55	9—47.3
61—70	10—16.66	3—10	5—26.3
71—80	5— 8.5	3—10	1— 5.2
	60	29	19

Alive .....29 or 50% of total or 60% of those known
Dead .....19 or 31% of total or 40% of those known
Not heard from.....12 or 20% of total
Males .....48 or 80% of total
Females .....12 or 20% of total
Males dead .....13 or 36% of those known
Females dead ..... 6 or 60% of those known

TABLE 2

Location and Radiation of Pain

I. *Substernal* 23
1. Without Radiation 6 (Localized under mannubrium 1)
2. To R. & L. arm 7
3. To L. chest and arm 2
4. To Back 2
5. To Epigastrium 1
6. To mid line of back to neck to R. and L. shoulder 1
7. To throat 1
8. To R. and L. arm and jaw 1
9. To L. side of neck, shoulder, arm and scapula 1

II. *Precordial* 9
1. Without Radiation 2
2. To L. shoulder and arm 4
3. To entire chest 2
4. To interscapular region 1

III. *Epigastrium* 9
1. Without Radiation 1
2. To R. shoulder and arm 3
3. To L. arm 3
4. To R. and L. arm and around side of chest to back 1
5. To R. U. Q. 1

IV. *Miscellaneous* 10
1. R. chest to R. shoulder and arm 3
2. Both sides of chest ant. to R. and L. arm 1
3. L. shoulder 1
4. L. shoulder to upper chest 1
5. L. elbow to shoulder 1
6. R. U. Q. 1
7. Jaw to chest 1
8. Lower abdomen to back, up spine—L. little finger up arm to precordium.

V. *Prodromal weakness* 6

TABLE 3

Associated Conditions

1. Diabetes—2.
2. Thyrotoxicosis—2.
3. Mitral insufficiency—2 } combined 1
4. Mitral stenosis—1 }
5. Preexisting auricular fibrillation—1.
6. Gall bladder disease—4.
7. Asthma—1.
8. Syphilis—1.
9. Enlarged heart (x-ray)—11.
10. Dilated Aorta—5.

Complications

1. Auricular fibrillation—5.
2. Auricular flutter—1.
3. Extrasystoles—21.
4. Partial heart block—10.
5. Complete heart block—1.
6. Friction rub—9.
7. Pulmonary infarcts—4.
8. Embolism of popliteal artery—1.

DISCUSSION

Dr. J. P. Simonds (Chicago): This very interesting paper, I think, should receive a great deal of notice and publicity, because it calls attention to a disease that is of very great importance. It is not only important because it is so frequent in patients who have reached middle age, but also because it is one of those diseases in which the results of treatment depend so much upon an accurate or correct diagnosis.

Several years ago I served as coroner's physician in Cook County. Whenever I was ordered to investigate the death of a middle-aged or elderly patient who was said to have died of ptomain poisoning or acute gastritis, I was reasonably sure to find that death was due to coronary thrombosis. This condition was not very well known at that time. Because its clinical manifestations, such as the character of the pain, the fever, the leukocytosis, and the other clinical manifestations that Dr. Priest mentioned, are better known today than they were even ten years ago, there is a better chance for patients who are the victims of this condition to survive, for the chances of survival in most cases are proportional to the correctness of the diagnosis.

As one studies these cases he is impressed more and more with the remarkable ability of the heart to adapt itself to the most amazing pathological changes if it is given an opportunity. Nature seems to take care of matters of this sort in an unusual way. The collateral circulation between the different branches of the coronary arteries is small and inadequate in children and young people. With advancing age, the collateral circulation becomes more abundant and the connecting vessels are larger in their caliber. This, of course, is a most favorable condition for patients who suffer from coronary thrombosis.

One great danger in coronary thrombosis is that necrosis of part of the heart wall will result in an immediate widening of the mitral ring, or the involvement of the papilary muscles, so that a very sudden insufficiency of the mitral valve is produced. Insufficiencies of the heart valves in the ordinary chronic type develop rather more slowly.

Another disaster that may come about is that the healthy portion of the heart muscle may tear itself loose by its contractions from the necrotic portion, and thus lead to a hemorrhage into the pericardial cavity, which, of course, is very rapidly fatal.

The chief hope for these patients is that if they are kept perfectly quiet, and the heart protected from the least possible strain, it will be able to carry on, handicapped as it is, until this necrotic portion can become organized and its place taken by fibrous tissue. As a rule, the parietal pericardium becomes firmly attached over this infarcted portion quickly and helps to guard against a fatal rupture. If the patient survives, the whole mass of necrotic heart muscle ultimately becomes replaced by fibrous tissue. Any pathologist who has had any very extensive experience has been surprised many times at the relatively huge amount of heart muscle that has been replaced by fibrous tissue, and yet that heart has been able to carry on and the patient

live comfortably for many years. The chief hope for a patient in the acute stage of coronary thrombosis is an early correct diagnosis and giving the heart a chance to adapt itself to the change.

I should like to ask Dr. Priest whether he has any data in regard to the time that the leukocytosis develops after the onset of the pain?

Dr. C. A. Earle (Desplaines, Ill.): I should like to ask the doctor whether he has had any experience with the vascular dilators—an example of one is theocalcin, or some such name—not particularly for the acute attack, but for the prevention of recurring attacks.

Dr. N. S. Davis, III (Chicago): I was very much interested in Dr. Priest's paper. I think there are one or two things I would like to emphasize. One is that while this is primarily a disease of the late fifties and sixties, you do see it not infrequently in people under thirty—more frequently than is commonly believed.

Also, I want to mention the importance of rest for a prolonged time in the treatment of these patients to give the infarcted area an opportunity to organize.

Another thing, is that we do not infrequently get coronary occlusions without pain, and they may be very extensive occlusions, as in a case that we had at a Pathological Conference recently. In this case there was a combination of hypertensive disease and old rheumatic disease, in which there was a coronary occlusion without pain, apparently two years or so before the patient's death. There was at that time a sudden onset of heart failure symptoms, especially respiratory-pulmonary congestion. At autopsy there was a very much thickened myocardium except around the apex, where it was practically completely replaced by fibrous tissue, and a beginning aneurysm of the heart.

Another thing is the way a patient can live with extensive involvement of two branches of the left coronary. We had a patient in whom the first occlusion was about a year before death. He had a second occlusion about a month and a half before death. Both of these became canalized. In one there was a calcium deposit so that at postmortem one could get the sound of the calcium in the thrombus. The cause of his death was an obstruction to one of these canalizations.

Another case, that had had an occlusion of one branch of the left coronary a month or two before admission to the hospital, came in with a fresh coronary occlusion and lived about thirty hours after the occlusion. That was a case in which the second occlusion was in the opposite branch. As I remember the first had been in the left and the second in the right branch. He lived for thirty hours after the occlusion. We have had several cases that have lived quite a while after lesions in both branches of the left have been formed and they have lived quite comfortably.

Dr. Charles R. Wiley (Chicago): The division of the sections into medicine and surgery, particularly in relation to this type of case—coronary thrombosis—is perhaps the wrong procedure, I think an important thought in connection with coronary thrombosis is the fact that throughout the country in general hospitals, due to the newness of the recognition of this malady, many cases go to surgery and fatal termination, particularly gall-bladder surgery, that look definitely like coronary occlusion.

I think the message the Doctor gave this morning is one to be taken home by the surgeons, and it is a subject that should be thoroughly understood. Too often these cases are operated on due to the lack of a medical man in attendance on the case—that is, a medical man who is thinking about the probability of coronary occlusion.

The sudden coronary occlusion is less common than the gradual sclerosis.

Most of us who are doing this type of work have seen at least ten or fifteen cases of a gradual sclerosis of the vessels, either of the small branches or of the main vessel, followed later by this complete occlusion. It seems to me that these sclerotic cases are just as important to recognize early and to advance a method of treatment which will prolong their lives.

Every hospital and every doctor should make use of electrocardiography in relation to substernal pain. While it is not always positively conclusive, still it is a great benefit in assisting in the interpretation of these symptoms. The reading of the graph after a few weeks study is a simple procedure. The reading of the normal graph and the differentiation in direction, particularly of the "T" wave is relatively simple. Electrocardiography is a great aid in this new and very dramatic subject of coronary thrombosis.

Dr. Walter S. Priest (Closing): I want to thank all the discussants for their extremely pertinent points, especially as to pathology, a phase of the subject that I purposely did not take up because of time limitation.

As to the length of time it takes leukocytosis to develop, it is a matter of a few hours. We have demonstrated leukocytosis in patients two hours after the attack. As to how soon before that it develops, I have no available data. It lasts for a few days and coincides somewhat with the elevation of the temperature.

In regard to the use of the vaso-dilators. In this series of patients and referring to those who have recovered and whom we are attempting to carry on, not all of them have received vaso-dilators. I get the impression from going over their records and from personal experience that they do better with the use of the vaso-dilators, especially of the type you mentioned. I see no contraindications to their use, and I see no reason why they should not help.

Dr. Davis very properly called attention to the occurrence of sudden coronary thrombosis without pain. Nine of the patients in this series had attacks of syncope and dyspnea without pain, then later experienced the more typical attacks. I think that these prodromal attacks were caused by coronary occlusion, as least in most instances.

I do not want the members to get the idea that I decry the use of the electrocardiograph. My purpose was to emphasize that coronary thrombosis can be diagnosed without an electrocardiogram and, conversely, that to make a diagnosis from the electrocardiogram alone is risky. I use it on every patient with suspected

heart disease, and I am beginning to urge patients past middle life who come in for physical examination and check-up to have an electrocardiogram made as a basis for future comparison. It is one of the most helpful things in determining what has happened to a heart later on to have a previous electrocardiogram made when the patient had no heart symptoms. One of the greatest uses of the electrocardiogram in coronary thrombosis is in following the progress of the acute attack. During this period the records change very rapidly, often from hour to hour and from day to day. As long as these changes are going on, we feel that the repair process is going on. When the record becomes constant, we feel that in all likelihood organization has taken place and the infarct is safer from the standpoint of possible rupture than it was before.

SCARLET FEVER IMMUNITY AND STREPTOCOCCAL PUERPERAL INFECTION*

G. E. Hudson, B. S., M. D.,
CHICAGO

Maternal care, antepartum, intrapartum and postpartum, has for its chief aim the prevention of disability, morbidity, and mortality. Nearly all first-class obstetric clinics have long since ceased to boast of their low maternal mortality as it is a factor common to them all. Where these same clinics differ widely, however, whatever standard may be used in comparing their work is in the degree of morbidity and disability, and it is in precisely these fields that much can be done to improve the results.

The factor with which we particularly wish to deal in this paper is infection. As everyone now appreciates, infection depends on the virulence of the organism, the avenue of infection and the patient's immunity to the invading organism. Any sin, therefore, of omission or commission which will result in trauma, in introducing a foreign organism to the external or internal genitalia, in deliberately opening an avenue of infection, or in lowering the patient's resistance, should meet the condemnation it so richly deserves.

There has been considerable disappointment professed by our profession concerning the results of antepartum care. The trouble is that as doctors many of us are not doing our whole duty. In the antepartum period we have concerned ourselves largely with the prevention and treatment of major complications and have neglected supposedly minor ailments with all too frequently very unpleasant results in the intrapartum and postpartum periods. Thus antepartum care has consisted in looking for signs and symptoms of syphilis, ruptured uterus, placenta previa, abruptio placentae, chronic pulmonary and cardiac diseases, abnormal pelves, and the toxemias of pregnancy. This is excellent so far as it goes, but what of the many patients who pass through our large clinics, who, among other things, are weak, anemic and undernourished, and go into labor in this condition without having had a thorough examination, a hemoglobin determination or even any instruction as to exercise, rest, and diet? Such patients cannot be expected to meet successfully even the less virulent invader.

Then, during labor, we are often grossly negligent of our very evident duty to conserve the patient's energy and thereby maintain her resistance to infection. Rest and nourishment are so easy to provide and so often neglected. The patient has weak, ineffective pains over a long period of time without any effort being made either to eliminate them or to boost them to the point where they can dilate the cervix. The result is that the patient's vitality is sapped and no work accomplished. Sometimes on the other hand she is permitted to suffer unnecessarily severe contractions without the administration of sedatives in any systematic manner. In either case she frequently is allowed to go through twenty-four, forty-eight or even seventy-two hours of labor with only the feeblest efforts on the part of her attendant to induce her to take nourishment. The result of this gross negligence is an increase in the incidence of operative procedures such as Dührssen's incisions, versions, forceps and cesarean sections with their bitter trail of morbidity, invalidism and even death.

Hemorrhage in the third stage of labor is likewise a common cause of lowered resistance and consequent infection. Apart from reducing to a minimum the amount of blood lost in a Schultze or physiological separation of the placenta, everyone should familiarize himself with the signs of a Duncan separation and the proper procedure to be adopted in such a case, for it is usually in Duncan separations that excessive

*From the Department of Obstetrics and Gynecology, University of Chicago.

*Read before the Chicago Medical Society, April 15, 1931.

amounts of blood are lost if appropriate measures are not taken.

Conditions which predispose to subinvolution and bleeding in the puerperium are often overlooked. Anything which impairs the contractile power of the muscle fibres necessitates the administration of ergot, prophylactically, during the first twenty-four hours postpartum and perhaps longer, as the best barrier against postpartum pelvic infection is adequate contraction and relaxation of the uterus. Some of the conditions which thus call for ergot are prolonged labor, polyhydramnios, twins, fibroids, chronic pelvic infection, operative delivery, Credé of the placenta, great multiparity and general ill health, while in the more remote puerperium the commonest cause of subinvolution and bleeding is probably third degree retroversion of the uterus. If, however, from any cause we find a hemoglobin of less than 45 per cent. at any time during convalescense, the patient should be immediately transfused, otherwise, even if she does not fall a prey to organisms lurking within or without, her convalescence will be unduly prolonged.

As to avenues of infection, more or less trauma to the passages will ensue, whatever the procedure employed in delivery, but whether we should routinely open up large avenues of infection in the form of deep episiotomies is the subject of considerable controversy. Personally we believe, that if there is no fetal indication for emtyping the uterus and the patient can deliver spontaneously without a laceration of the perineum in the course of one and one-half to two hours in the second stage, provided the head has not been on the perineum for over half an hour, she should be permitted to do so, especially during the winter months when droplet infection is so common. If we follow this course, the majority of multiparae with a vertex presentation will not need an episiotomy, especially if a little anesthetic is given to relax the perineum while the head is being delivered. If, however, the patient will evidently lacerate herself, and this will apply to most primiparae, then a clean-cut incision is far preferable to a ragged laceration.

Antisepsis and asepsis should receive the strictest attention, and the former should never unnecessarily replace the latter. To this end we believe that, unless it is absolutely necessary, nothing should enter the vagina from the beginning of the ninth month to the end of the second week postpartum. This applies alike to intercourse, to hands, packs, bags, douches, electric cauteries and forceps.

Even after we have given all the factors enumerated our most careful attention, a certain measure of infection is still present even in the best clinics; and the prevention of this infection constitutes a direct challenge to our energy, sincerity and powers of investigation.

Considerable work is being done on the nature and source of the organisms responsible for puerperal infection as well as on the possibility of actively or passively immunizing the patient against them.

It is the consensus of opinion among the more thoughtful and experienced of the profession that organisms present in the vagina before delivery seldom cause puerperal morbidity. This is supported by a certain amount of experimental work important among which is that recently published by Taylor and Wright.[1] These investigators listed the organisms present in the antepartum vagina as the staphylococcus albus, the staphylococcus aureus, diphtheroid bacilli, coliform bacilli, and the non-hemolytic, hemolytic, pseudohemolytic, and anaerobic streptococci; but their work shows that, although there is some slight risk arising from this endogenous source, it is the bacteria which enter the genital tract shortly before, during or shortly after labor that are practically always responsible for infection.

Of the organisms arising from an exogenous source the one least commonly found, but most frequently responsible for serious puerperal complications, is the streptococcus hemolyticus. Numerous efforts are being made to determine what particular strains of this organism are found; and especially if any of them are related to the strains causing scarlet fever, against which we have a more or less effective serum for active and passive immunization. It is our findings relative to this subject that we wish to report in this paper.

This work was done on the obstetric service of the Long Island College Hospital, Brooklyn, New York, and was suggested by a review of 8,000 cases by Adair and Tiber,[2] from which

they concluded, among other things, that "those who had a previous infection with the streptococcus as in scarlet fever are less liable to a morbid puerperium."

Probably the best experimental work on the production of immunity to streptococcal puerperal fever was done by Lash and Kaplan,[3] who, with the toxin obtained from the puerperal streptococcus hemolyticus produced sufficient antitoxin to protect rabbits against the lethal dose of this same organism. This seemed to be a long step forward. The great difficulty is, however, that immunity to one strain of streptococcus or even to a number of strains, by no means implies immunity to all; and we have no reason to believe that pelvic puerperal fever like scarlet fever may not be caused by numerous strains of the streptococcus hemolyticus.

In our work two hundred and forty-eight cases were given the Dick test. Of these, forty-nine were positive, and one hundred and ninety-nine negative. Of the forty-nine positive cases, thirteen were immunized against the streptococcus scarletinae, and thirty-six were permitted to remain susceptible. Of the one hundred and ninety-nine negative cases, one hundred and thirty-five received no injections, while the remaining sixty-four were hyperimmunized. Both immunization and hyperimmunization were induced by making four subcutaneous injections of toxin at weekly intervals. The first injection consisted of 500 skin test doses, the second of 2,000, the third of 5,000, and the fourth of 10,000. Where a positive patient was being immunized a Dick test was made two weeks after the last injection. This proved to be negative in all except one case where an additional 20,000 skin test doses failed to produce immunity.

Patients subjected to this experiment were receiving routine prenatal care, and many of them were with difficulty induced to submit to the discomfort of the injections and the inconvenience of making extra visits. All patients investigated were delivered in the hospital, where they were very carefully watched throughout the entire intrapartum and postpartum periods.

Of the two hundred and forty-eight women who received the Dick test, one hundred and eighty-eight delivered during the period of investigation. Of these, twenty-nine were susceptible, thirteen had been immunized, one hundred were originally negative, and thirty had been hyperimmunized.

In the one hundred and eighty-eight deliveries there were no deaths due to infection, and only eight cases developed an infection of positively pelvic origin. As two of the eight infected cases did not show their first elevation of temperature until after the fifth day, no intrauterine culture was taken, as it has been repeatedly shown in such cases that many organisms are present in the uterus; and it would have been impossible to tell which, if any, of them were responsible for the rise. The remaining six infected cases had their elevation within the first four days; and intrauterine culture taken a few hours after the rise in temperature yielded a pure culture of streptococcus viridans in one case and of streptococcus hemolyticus in the remaining five.

The intrauterine cultures were taken with the Döderlein-Little tube according to the technic described by Williams.[4] That this technic was effective is proved by the fact that the organisms were isolated in pure culture.

Bacteriological tests showed that none of the hemolytic streptococci isolated from the uterus belonged to the larger groups of the strains of streptococci causing scarlet fever; but of course, there may be isolated from scarlet fever patients a considerable number of strains which cannot be placed in these larger groups.

None of the eight infected patients gave a history of scarlet fever, but little importance is attached to this fact, as, on being questioned closely, most of them were uncertain as to whether they had had the disease in early childhood or not.

The essential point in this investigation is that of the eight cases developing a genital puerperal infection all were Dick negative, and one had been hyperimmunized; and, although the series is a small one, the results prove conclusively that immunity to scarlet fever as determined by the Dick test does not necessarily protect the puerpera against genital infection of streptococcal origin.

This represents one of the many attempts that have been made in recent years to protect the prospective mother against one of the most dreaded complications of pregnancy. So far practically all such efforts have ended in failure.

Streptococcal puerperal fever is ever with us, and it may not be amiss to emphasize once more the line of treatment evolved by our best obstetricians in the last thirty years.

1. Absolute rest in bed in the Fowler position.

2. Ice cap to lower abdomen if there is no distention. If there is distention, relieve it as completely as possible, before applying cold.

3. No violent catharsis. If the bowels are not moving regularly an enema should be given every other day. This relieves pelvic congestion.

4. Maintain and if possible strengthen the patient's resistance. This is best done by giving repeated small blood transfusions. From 150 to 250 c.c. should be given every three or four days. The same donor should not be used more than three times. The transfusions should be started as soon as the diagnosis is made. The earlier they are given the more marked their effect. If blood transfusion is not feasible, foreign proteins may be injected intramuscularly. Various foreign proteins are now available, but whole blood is probably best. It is doubtful if any of them are of much value unless the injections are followed by an increase in the white cell count of the blood. The patient's appetite should be carefully watched. Diet and medication should be directed toward the building of blood elements. Sunshine and fresh air are very important, and the patient's bed should be wheeled to the porch for a short time each day if weather conditions permit.

5. Last, but by no means least, keep out of the uterus, especially with the curette. One cannot serve long on the wards of any large hospital without feeling that, except for the obstetric forceps, the most dangerous weapon in the hands of a great many men is the well-polished curette. That person, whatever his reputation or skill who introduces a curette in a uterus that is the seat of an acute or subacute infection either ignores, or is pitifully ignorant of, the pathological anatomy of the infected pelvis. Curettage causes exacerbation and dissemination of the infection, and if the patient does not die of a septicemia she is fortunate, indeed, if she is not left an invalid for life.

In conclusion I wish to thank Dr. F. L. Adair, Chief of this Department and Dr. A. C. Beck of Long Island for their valuable counsel and cooperation; also, Miss Mary Manning of Long Island for her practical assistance throughout the whole period of the investigation.

REFERENCES

1. Taylor, Joan and Wright, H. D. The Nature and Sources of Infection in Puerperal Sepsis, J. Obst. & Gynec. Brit. Emp. 37:2, 1930.

2. Adair, F. L., and Tiber, L. J. Infection in the Puerperium with an Analysis of Eight Thousand Cases, Am. J. Obst. & Gynec. 17:4, 1929.

3. Lash, A. F. and Kaplan, B. Puerperal Fever; II Streptococcus Hemolyticus Toxin and Antitoxin. J. A. M. A. 86:1197-1198, 1926.

Lash, A. F. The Therapeutic Value of a New Concentrated Streptococcus Antitoxin in Puerperal Fever. Am. J. Obst. & Gynec. 17:3, 1929.

4. Williams, J. W. Obstetrics. Sixth Edition, p. 1084.

THE THERAPEUTIC USE OF OXYGEN AND CARBON DIOXIDE

H. P. MILLER, M. D.
St. Anthony's Hospital
ROCK ISLAND, ILLINOIS

The purpose of this article is a brief review of the therapeutic use of oxygen and carbon dioxide. The use of gas in medicine goes back many years to the original use of nitrous oxide in anesthesia in combination with oxygen. This addition to our armenentarium is well worth considering. The apparatus is simple and can be operated successfully under the physicians' directions by a qualified nurse.

Carbon Dioxide and Oxygen Mixture. Professor Yandell Henderson[1] studied the use of carbon dioxide and oxygen in resuscitation from carbon monoxide poisoning. By animal experimentation, later clinical trial, he arrived at the conclusion that a combination of 5% carbon dioxide with 95% oxygen was the best proportion. The carbon dioxide stimulates the respiratory center while the oxygen tends to force free the carbon monoxide from the hemoglobin according to the principle of mass action. The mixture is conveniently applied by means of the "Inhalator." This is simply a device consisting of a mixture of 5 per cent. carbon dioxide and ninety-five per cent. oxygen in a single portable tank from which the gas passes through a reducing valve reading in liters per minute into a rubber reservoir bag then on into a mask from which the

patient aspirates the gas. On expiration, the breath passes out through an exhaling valve to the open air. The apparatus is especially valuable in first aid work. Operation by firemen and industrial workers has proved successful in emergencies. The mixture is valuable wherever artificial respiration is used. The machine does not force the gas into and out of the respiratory tract. Artificial respiration is performed by the prone pressure method and the gas is inhaled by the patient in the normal manner in which air is breathed. A large number of these inhalators are now in use all over the country, police departments and fire departments being equipped, also many ambulances and a few hospitals.

Oxygen. Carbon dioxide and oxygen may be used separately. Pure oxygen has proved itself of value in pneumonia, cardiac conditions, asthma, hyperthyroid crises and war gas poisoning.[2] Contrary to older opinion, it is possible to raise the oxygen content of the blood even in normal persons as well as in pneumonia and allied pathological conditions. This fact rests on a sound physiological basis.[3] In a normal man, breathing of three liters of oxygen per minute will decrease the percentage of unsaturation from 4.4 to 1.87. In pneumonia, instead of carrying the full load of ninety-five per cent. oxygen, the hemoglobin may be as low as eighty per cent. saturated. Briefly, the deficiency is due to part of the lung tissue being consolidated and to thickening of the membrane lining the aveoli through which the gas must diffuse. Blood leaving the lungs is then a mixture of unsaturated blood from the diseased portion and saturated blood from the healthy portions. An equilibrium is reached which is below the normal saturation point. By breathing a stronger oxygen atmosphere than normal the partial pressure of the gas is increased in the alveoli. This will favor more rapid diffusion through thickened membranes of the diseased portion also allow increased oxygen to go into simple solution in the blood of the diseased and healthy portions. Therefore, the final mixture will be nearer the normal oxygen saturation when equilibrium is reached. When the supply is just on the border line of being adequate to supply the tissues and nerve centers such a help may turn the tide to recovery. Easier and deeper breathing, slowing of the pulse, lessened cyanosis and greater comfort are noted in the patient. A point has arisen as to the possible harm from the continuous use of oxygen. Animal experimentation has shown that after a long period of time some edema may be set up in the aveoli and bronchioles. In the use of oxygen for as long as a week by the oxygen tent method there is no evidence experimentally or clinically that any harm results to the tissues exposed to the gas.

The nasal catheter method, the so-called oxygen tent method and the oxygen chamber constitute the three modes of application used. In both the nasal method,[4] and the oxygen tent method the same type of apparatus is used to supply the gas. The high pressure commercial oxygen tank of two hundred and twenty cubic feet capacity supplies the gas. This contains oxygen enough, ordinarily for a maximum of 20 hours continuous administration, about 5 to 7 liters being consumed per minute by the patient. This tank has a reducing valve which reduces the pressure down to the low pressure suitable to breathing. The reducing device is similar to the reducing valves that have been used for many years on gas anesthesia machines. This reducing valve has a small gauge on it which indicates the flow of gas in liters per minute. Rubber tubing connects the reducing valve to the nasal catheter or to the oxygen tent. If the nasal catheter method is used the rubber tubing is connected to a glass Y and two size sixteen soft rubber catheters are inserted into each nostril back almost to the posterior fornix. These have lateral perforations in them in addition to the perforations at the tip. The catheters and Y tube are brought up to the forehead and attached with adhesive. This is a very efficient method of administering oxygen. The face is exposed for administration of fluids and the only discomfort is that of having the catheters inserted into the nostril and the fact that they must be removed and cleaned about every eight hours. A greater concentration can be maintained in the alveoli with the catheters than by the tent.

The canvass oxygen tent is of proper size to enclose the head and has suitable windows for observation. The rubber tubing is connected to an inlet in the roof and the oxygen blows down

over the face. An advantage of the tent method is that it can be used on infants. A disadvantage is the celluloid material used in construction of the windows. This material in the presence of oxygen is extremely inflammable. A safer material should be developed. In using the tent or catheter method carbon dioxide can be added in by means of a Y connection and administered to the point of slightly stimulating the respiration if this effect is desired.

The respiration calorimeter of the physiologists might be regarded in a way as a type of oxygen chamber. The oxygen chamber has been used in some of the hospitals in the larger centers or clinics and is a very desirable method but very expensive to construct a special room for this purpose. At one clinic[5] they have reported splendid results on the use of this oxygen chamber type of administration in cases which apparently were moribund before being so treated. The chamber is simply an air tight room in which the oxygen is maintained at a certain concentration and means are present for removal of carbon dioxide and maintenance of proper temperature and humidity.

One of the things that will serve to popularize use of oxygen has been pointed out by Barrach. Ordinary commercial oxygen is suitable for use medically. Oxygen for commercial use is now made all over the country in towns of even moderate size for the trades. Our local manufacturer states that his gas is absolutely pure except for a slight trace of argon which is an inert gas and is, of course, present in ordinary air also in a very small quantity. A refill of a tank in our locality costs four dollars and this is sufficient to supply a patient for 10 to 20 hours, depending on the amount used. A patient can be kept in an oxygen atmosphere for a very reasonable sum.

Carbon Dioxide. Carbon dioxide is a stimulant for the respiratory center. To use it alone no elaborate apparatus is necessary. A small "D" size low pressure tank does not need a reducing valve. The tubing is directly connected to the opening valve on the tip of the cylinder and passes out through a wash bottle of water acting as a gauge to the amount of gas flowing. The bottle is connected with an ordinary funnel by rubber tubing. The funnel is held near the patient's nose and mouth and the gas breathed in. After three to six breaths the respirations will start to be speeded up and this is the effect desired. Carbon dioxide has been used by us many times for hiccups with good effect. Hyperventilation of the lungs as the patient is coming out of the anesthetic is a recent and valuable application. By switching to a strong concentration of carbon dioxide as the patient comes out of a gas anesthetic the lungs can be opened up and the respirations speeded up at will. The experimental work of Yandell Henderson[6] has shown that postoperative pneumonia probably starts as an atelectasis of lobules. In dogs induced atelectasis could be cleared up as shown by their x-ray studies by the use of these inhalations. This is an important point when we remember one death in two hundred and forty, postoperatively, is due to pneumonia. In addition to the post anesthetic use, inhalations of carbon dioxide may be given three times daily for a few minutes for the first three or four days during the period in which postoperative pneumonia is common. This applies especially to the upper abdominal operations where coughing is avoided and the lower chest splinted because of pain.

SUMMARY

Carbon dioxide and oxygen are used alone or in combination. Oxygen is used alone in the oxygen tent, nasal catheter method, or oxygen chamber. Oxygen is used in combination with carbon dioxide in the inhalator. Finally, carbon dioxide is used alone for hyperventilation of the lung and for the treatment of hiccups. Suitable apparatus for the use of gases is available and is economical and easily operated.

BIBLIOGRAPHY

1. Henderson Y., Haggard, H. W.: The Treatment of Asphyxia by Means of Oxygen and Carbon Dioxide Inhalation, J. A. M. A. 79:1137, (Sept. 30) 1922.

2. Army Medical Bulletin No. 16, pp. 58.

3. McLoed, J. J.: Physiology and Biochemistry in Modern Medicine, C. V. Mosby Company, St. Louis, 1930.

4. Barach, Alvan L.: Administration of Oxygen by the Nasal Catheter Method, J. A. M. A. 93:1550, (Nov. 16) 1929.

5. Haines, Samuel F., Boothby, Walter W.: Oxygen Treatment with Special Reference to Treatment of Complications Incident to Goitre, Collected Papers of the Mayo Clinic XXI: 482-490, 1929.

6. Yandell Henderson et al.: The Treatment of Pneumonia by Inhalations of Carbon Dioxide, Arch. of Internal Medicine 45:72-91, (January) 1930.

THE USE OF BACTERIOPHAGE IN STAPHYLOCOCCIC INFECTIONS

A. A. Janson* and
Reuben L. Larsen, A.B., M.D.,†
EVANSTON, ILL.

Bacteriology is, comparatively speaking, a new science. It has, however, during the short course of its existence yielded an abundance of useful information and is now one of the most important of the basic medical sciences. Through bacteriology, the specific factors in the etiology of many previously obscure conditions have been disclosed; the interpretation of the pathogenesis of infective processes has been clarified; effective therapy, active and prophylactic, has been made possible in many instances; prognosis has been made more intelligent and rational. Every branch of clinical medicine has been perceptibly and favorably affected by the knowledge supplied through the pursuit of the study of this new science.

Immunology, the study of ways and means of protecting the body against bacterial invasion, is undoubtedly one of the most important of the contributions of bacteriology to clinical medicine. Bacteriology has afforded the basis for theoretical conceptions and actual accomplishments in immunology which has elevated the latter to a plane so highly developed that it is frequently thought of as a special science, though it is essentially a component of the broader science of bacteriology. The study of immunity has opened a field so vast that it offers practically unlimited opportunities for research into problems but little understood as yet.

It is our purpose to discuss but one phase of immunology and to submit our impressions and experiences in the making and use of bacteriophages.

Historical—It is of interest to note that certain immunologic principles were utilized by primitive peoples, thousands of years ago. Some are known to have treated the bites of poisonous snakes by the application of a paste containing the specific venom of the offending reptile. It is said to have been a common practice among ancient Chinese people to remove the crusts from smallpox lesions and to apply these crusts to the nasal mucous membranes of unaffected persons, thereby effecting immunization through a rudimentary method of inoculation. Other immunologic practices have been recorded, procedures which were effective though empiric. The step between ancient empiricism and modern rationalism and specificity in immunologic methods was a long one. The dawn of modern immunology begins with the time of Louis Pasteur.

Pasteur it was who conceived the idea that invading bacteria might be led to bring about their own destruction. His early work was done with the anthrax bacillus which was at that time a menace to the French sheep breeders and a serious economic problem to the nation. Through experimentation and practical application, he demonstrated that anthrax could be eradicated by vaccination. Thus were the basic principles of immunology established. Metchnikoff elaborated on Pasteur's work and gave it a broader significance. Under the microscope, he observed that leukocytes possessed the property of destroying and absorbing debris and bacteria and he it was that applied to them the name "phagocytes," derived from the Greek term meaning "eating cells."

Scientific experimentation requires a certain understanding of the underlying factors or principles of the problems under investigation. While Pasteur and his followers had unfolded the basic principles of immunity, it remained for the German scholar Ehrlich to evolve a workable and understandable theory of their mode of action. He projected his famous "side-chain theory" which, while it may have been incomplete or imperfect, was plausible and understandable and stimulated experimentation which has resulted in many invaluable contributions to the advancement of clinical medicine in general and of bacteriology in particular. Without such a working-rule as the Ehrlich theory, many valuable discoveries (such as the Wassermann reaction, based on the principle of complement fixation) would probably not have been possible.

One year before the death of Ehrlich in 1916, Twort[1] reported his remarkable discovery, known as "Twort's Phenomenon." This was to the effect that bacterial cultures contain ultramicroscopic particles, developed by the organisms in the culture, which are capable of destroying

*Director, North Shore Clinical Laboratory, Evanston, Illinois.
†Clinical Assistant in Gynecology, Northwestern University Medical School, Chicago.

the bacterial growth. Two years later, in 1917, the French scientist d'Herelle[2] corroborated Twort's findings and, by improving upon his procedures, succeeded in elaborating a practically available substance which was capable of counteracting the activity of the bacteria in the culture from which it was isolated. These particles were regarded as ultramicroscopic bacteria by d'Herelle and he called his preparation a "bacteriophage"—something which eats or destroys bacteria.

Since d'Herelle made his first report on bacteriophage in 1917, more than two thousand papers have been published on the subject. Notable among these contributions is the extensive work of Besredka[3] whose procedures varied somewhat from those of d'Herelle. Besredka used old cultures to obtain the substance which he termed "antivirus" while d'Herelle and his followers used young, actively growing bacteria. Arnold[4], Bordet[5] and others, with whom we are inclined to agree, believe that the substance known as bacteriophage is not an ultramicroscopic bacterial growth but a ferment. Other valuable reports are those of Rice,[6] Larkum[7] and Bozy.[8]

Early investigators in bacteriology observed certain cultural irregularities in bacterial growth and noted that these irregularities were especially evident with bacteria from the intestinal tract. With the development of knowledge concerning bacteriophages, it was found possible, in many cases, to isolate a phage from the feces of patients convalescing from infection, and also from sewage. This probably explains these cultural irregularities. Arnold, of the Illinois Public Health Department, has isolated a phage from the Chicago River. Such discoveries are of clinical importance and open wide fields for the future of bacteriophage research.

Laboratory Methods. When the use of a bacteriophage is contemplated in the treatment of an infection, it is of the utmost importance to first ascertain whether or not the available phage is active against the specific infecting bacteria. By obtaining a culture from the infected area, the efficacy of the phage may be tested in vitro before being used in vivo. The following method, a simple and feasible one, is used:

Make two cultures, one in 50 c.c. of broth and one on plain agar.

Incubate the agar culture for 12 to 18 hours.

Incubate the broth culture for 4 hours, then divide it among a number of sterile tubes, depending on how many bacteriophages are to be tested.

Label one of these tubes "Control" and add nothing to it.

To each of the other tubes, add one-tenth volume of the phage to be tested. Label them properly for identification.

Incubate all the tubes for 12 to 18 hours or longer.

If any of the phages used are effective against the organism being tested, the cultures to which these have been added will be clear, indicating destruction of the bacteria.

The control tube should be cloudy, indicating unimpeded growth.

Varying degrees of clearness may be observed in the different tubes. In such a case, the phage which has produced the clearest solution should be chosen for clinical use.

If none of the phages used will clear up the culture, it is an indication that none of them could be expected to be clinically effective. An autogenous bacteriophage should then be prepared. This may be accomplished through the "stepping-up process," as follows:

Make two cultures, one in broth and one in an agar tube. Incubate both for 18 hours.

Filter the broth culture through a Berkefeld filter.

Innoculate the surface of an agar plate with a loop of filtrate and a loop from the agar tube.

Incubate the agar plate for 18 to 24 hours.

Pick out the abnormal colonies, those with the "chewed" edges, and transfer them to another broth culture.

Incubate the new broth culture for 4 to 6 hours.

Add one-tenth volume of the first filtrate to the broth. Incubate again for 24 to 72 hours.

If the broth becomes clear, it contains a specific bacteriophage; if not, the process may be repeated until it becomes active.

Filter the clear broth through a Berkefeld filter.

The filtrate contains the bacteriophage in the form for clinical use.

While it is extremely desirable, as mentioned before, that the available phages be tested in vitro against a culture of the specific offending organism, before being applied clinically, it is not always possible or practicable to do so. Many conditions may make the delay inadvisable. A polyvalent bacteriophage may then be tried. While the use of such preparations will not be uniformly successful, it can do no harm and will succeed in many cases provided the diagnosis of the type of organism is correct and the polyvalent phage contains the antagonistic substance for the particular strain. We now have a polyvalent bacteriophage which is effective against more than thirty strains of staphylococci and

which has proved efficacious in a number of cases where cultures of the infecting organisms were not available.

Clinical Application. Most of our experience with the use of bacteriophages has been limited to its application locally at the site of infection and principally in the presence of staphylococcic infections. In some cases it has also been intramuscularly injected for a systemic effect. Local physicians have used our stock preparations and autogenous phages in the treatment of such varied conditions as infections in the external auditory canal and the nose, simple furuncles, multiple and persistent furunculosis, carbuncles on the neck and buttocks, secondary abscesses, etc. Their usual method of procedure is as follows:

About 1 c.c. of the broth containing the phage is injected directly into the infected area.

A gauze or cotton dressing, saturated with the solution, is placed over the infected area, covered with oiled silk and held in position by a bandage or adhesive strips.

The dressing is kept moist by periodically saturating it with more of the solution.

When the infection is in the ear canal or the nose, pledgets of cotton saturated with the solution are left in the cavities.

Intramuscular or intradermal injections of the solution may be used in addition to the local treatment when indicated.

The results from this treatment have been uniformly satisfactory. No failure has been encountered where the phage has been properly selected by typing in vitro previous to clinical application. Pain is promptly relieved, usually within a few hours, and a marked improvement is usually seen within twenty-four hours. When the infection is not too far advanced, abscesses are frequently absorbed without drainage. If the infection is advancing, localization takes place rapidly, drainage is established and often completed within forty-eight hours.

Discussion. Bacteriophage is made up of ultramicroscopic bodies which, whether they be bacteria or enzymes, are capable of reproduction as demonstrated through their growth in a culture. They reproduce at the expense of the bacteria in the culture which are dissolved and destroyed. Microscopic examination of a culture which has been exposed to an active bacteriophage shows no trace of bacteria or cell debris.

Repeated freezing of a solution of bacteriophage does not destroy its activity but heating to a temperature above 75° C. does. Injection of a bacteriophage into an animal stimulates the production of an antibody that neutralizes the lytic action of the phage. The fact that there is a large amount of protein material in the bouillon together with the by-products of metabolism of the young culture of bacteria, may be of significance.

CASE RECORDS

Case 1. Because of an unusual circumstance attending the successful management of this case, a rather full report is warranted.

The patient was a woman, 60 years of age, a diabetic who had for a long period shown a constant blood sugar level of 200 to 250 mg., though glycosuria was absent. For four years she had suffered from furunculosis constantly, most of the lesions appearing about the face and neck. The causative organisms were found to be staphylococcus albus and staphylococcus epidermidis. We had made two autogenous vaccines which had been tried without giving any relief. Her physician then determined to try a bacteriophage. Our stock phage failed to destroy the organisms obtained from the infected area, in vitro. In spite of this, we used it locally, but it failed in vivo as well. An autogenous bacteriophage was then prepared which, in spite of being repeatedly stepped up, failed to cause lysis of the infecting organisms in the test tube. Finally, on purely empiric grounds, we prepared another autogenous bacteriophage, using 2% *dextrose* broth in place of plain broth. This phage proved effective in vitro.

At this time, the patient was under the care of a surgeon, in addition to her regular physician, because of a carbuncle on the cheek. Because of her diabetes, the surgeon hesitated to incise it. Hot boric compresses irritated her and her condition was becoming serious.

When the dextrose phage was completed, the physician injected 1 c.c. directly into the carbuncle and applied a dressing saturated with the solution. Within two hours, the pain had subsided and, within 24 hours, free drainage had been established without the aid of surgery. The infected area was kept constantly covered with a dressing saturated with the bacteriophage and daily intramuscular injections of 1 c.c. of the solution were administered. A total of 20 injections were given.

The carbuncle healed promptly, without leaving a scar, and she has been entirely free from similar infections since that time, a period of nine months.

Case 2. A woman, 43 years of age, came to her doctor after suffering for three weeks from a carbuncle in the gluteal region. During this time, it had opened spontaneously and drained and closed again several times.

A culture showed a strain of staphylococcus aureus which was lysed in the test tube by one of our stock bacteriophages of a similar strain. The abscess was infiltrated with 1 c.c. of the phage and the dressings were kept saturated with the phage all night. Within 12 hours, the pain was relieved and free drainage

established. After 24 hours more, the abscess stopped draining and healed rapidly, granulating from the base outward.

Case 3. A man, aged 52, presented himself with a furuncle within the nose. A culture revealed the staphylococcus aureus which succumbed to our polyvalent bacteriophage in the test tube. The nostril was packed with cotton saturated with the bacteriophage. This was left in place over night. The abscess was promptly absorbed without draining and no further treatment was necessary.

Case 4. A male, 28 years of age, was referred for typing of infection. He had a traumatic abscess on his leg which was causing him great pain. The culture showed the causative organism to be the staphylococcus albus epidermidis and the broth culture cleared after incubation with our phage No. 7, made from a similar strain.

The infection was spreading at this time. One c.c. of the phage was injected into the infected area and the dressings were kept wet with the solution. Within 24 hours, the infection had localized but was still very painful. The area was reinjected with 1 c.c. of the phage and the dressings continued as before. Drainage was established spontaneously and within 72 hours of the first injection, drainage was complete, pain was completely relieved and granulation was beginning.

Case 5. A woman, aged 55, had had a series of styes over a period of several months. The same condition had occurred perodically for the past several years. When seen by us, she had a row of draining styes which were causing great discomfort.

The culture showed the staphylococcus albus epidermidis as the offending organism and it responded, in vitro, to our polyvalent bacteriophage. Local applications of this phage for 24 hours caused complete disappearance of the styes and there has been no recurrence in the past two months.

Case 6. This case illustrates the necessity of using a specific bacteriophage for a specific organism. A man, aged 71 yrs., had a carbuncle on his back. He also gave a history of having had a lung abscess four years previously. It was impossible to obtain constant cultures. It was a polybacterial infection showing various types of cocci and bacilli at different times. Our polyvalent bacteriophage was nevertheless tried but without success.

Case 7. An exceedingly painful condition was seen in a woman, aged 32, whose external auditory canal was literally filled with small furuncles. The canal was closed so tightly that she could hear nothing in that ear. She had been using a commercial preparation of bacteriophage in a jelly form for two weeks without effect. There was no drainage at the time we saw her and no culture was obtained.

A pledget of cotton saturated with our polyvalent staphylococcus bacteriophage was applied over the external ear and kept moist. Within 24 hours, the pain was notably decreased and drainage established. A culture was then made which revealed a staphylococcus which was sensitive to the phage used. Within 72 hours, the pain was entirely gone, drainage had ceased and granulation had begun.

Case 8. A woman, aged 37, suffered from a traumatic infection in the distal phalanx of one of her index fingers. When first seen, it was a spreading cellulitis, without localization, and streaks of lymphangitis were seen running up the hand and well above the wrist. No culture was possible at the time so the area of greatest infection was injected with one-half c.c. of polyvalent bacteriophage and constant wet dressings, saturated with the phage, were begun. In 12 hours, the infection had localized and the lymphangitis had disappeared. Healing did not take place at once because considerable sloughing eventually took place but no more difficulty was encountered as far as the infection was concerned.

A culture taken after drainage had been established showed the staphylococcus aureus which was susceptible, in the test tube, to our polyvalent bacteriophage.

Case 9. A boy, aged 4 yrs., had an abscess of the lower eyelid. It was not draining and no culture was obtained. Local application of the polyvalent phage caused such rapid disappearance of the lesion that it was impossible to have the child returned for a culture or further observation.

Case 10. A surgeon, past 70 years of age, had been taking a series of vaccine treatments for arthritis for the past year. At this time, every injection was followed by an abscess and when seen by us he had about five abscesses on each arm. They were large and contained great quantities of pus though they did not cause much pain. Repeated cultures were made from a number of different abscesses but none of them showed any growth. The abscesses were sterile.

In spite of this, each abscess was injected with 1 c.c. of our polyvalent bacteriophage and dressings saturated with the phage were applied. The same procedure was repeated the following day. In two days, all the abscesses had disappeared and there have been no recurrences although the vaccine injections have been continued.

Observations. Organisms with like cultural characteristics do not necessarily respond to the same bacteriophage. A culture of staphylococcus aureus may not be lysed by a phage prepared from another culture of staphylococcus aureus. The same is true of staphylococcus albus. There are, apparently, numerous strains of similar organisms with similar cultural characteristics and the phage must be specific in order to be active. On the other hand, a staphylococcus aureus bacterophage will, at times, destroy the staphylococcus albus and the reverse is also true.

This observation emphasizes the fallacy of relying too greatly on stock preparations. Unless such phages are prepared from a large number of strains of the specific organism, failures will be frequent. It also substantiates our conten-

tion that, whenever possible, cultures of the infecting organism should be obtained and tested, in vitro, for its reaction to a number of specific bacteriophages or a polyvalent one. When a culture cannot be obtained, a polyvalent preparation should be used. The greater the number of strains represented in such a preparation, the greater will be the probabilities for success. When the available phages fail to destroy the culture in the test tube, an autogenous one should be prepared. Our own experience indicates that when a phage is inactive under laboratory tests, failure will attend its clinical use; and that in nearly every case where activity has been demonstrated in the laboratory, its clinical use will be attended by success.

Surface infections, especially in the region of the face, are usually caused by the staphylococcus albus while deeper infections, such as furuncles and carbuncles, are usually caused by the staphylococcus aureus.

The local application of bacteriophage is now also being accomplished through the application of a salve or jelly with the phage incorporated into it. Our experience with this method is as yet too limited to discuss but, theoretically, it should have some advantages. Intramuscular and intradermal administration is also being largely used in the treatment of chronic infections, especially of the streptococcic types, with considerable success. Many cases of chronic arthritis, where the streptococcus is recovered from the nose, throat, rectum or feces, have been successfully treated in this way.

CONCLUSION

Bacteriophage therapy offers a simple and unusually effective method of combating many types of bacterial infection and opens a vast field for research. Its present accomplishments are limited but real; its future possibilities are unlimited and can only be conjectured.

REFERENCES

1. Twort, F. W.: An Investigation on the Nature of Ultramicroscopic Viruses, Lancet, 2:124, 1915.

2. d'Herelle, F.: The Bacteriophage and Its Behavior, Trans. by Smith, G. H., Williams-Wilkins Co., Baltimore, 1926.

3. Besredka, A.: Local Immunization, Trans. by Plotz H., Williams-Wilkins Co., Baltimore, 1927.

4. Arnold, L.: Bacteriophage Phenomena, J. Lab. & Clin. Med., 8:720, 1923.

5. Bordet, J.: Concerning the Theories of the So-called "Bacterio Phage," Brit. Med. J., 2:296, 1922.

6. Rice, T. B.: The Use of Bacteriophage Filtrates in the Treatment of Suppurative Conditions, Am. J. Med. Sc., 170: 345, 1930.

7. Larkum, N. W.: Bacteriophage in the Treatment of Furunculosis, Mich. Dept. of Health Reprint, series 53, July, 1928.

8. Bozy, L.: Traitment des Infections Chirurgicates a' Staphylococcique. Compt. rend. Soc. de biol., J. A. M. A., 84:1389, 1925 (abstract).

CRANIO-CEREBRAL INJURIES*

J. D. KIRSHBAUM, M.D.

CHICAGO

I have purposely omitted the term skull fracture, as the subject, because it is a poor one and conveys no idea as to the extent of cerebral damage resulting from a head injury. It is only in recent years that the term skull fracture is being discarded for one that is more accurate anatomically.

Cerebral injuries are characterized by injury to the skull or calvarium and the cranial contents, cerebrum, cerebellum or medulla. Injuries to the skull may be divided into: Depressed fractures, simple or compound; Linear fractures of the vault; and fractures of the base. As to the incidence of fractures of the vault and base, about 90% occur in the base and 10% in the vault. (Lecount and Affleback—in a series of 450 post-mortems.) Cerebral injuries may be divided into: (a) Concussion, (b) Contusion, (c) Laceration of brain, (d) Hemorrhage of the middle meningeal artery which may be extra-dural or sub-dural. Concussion is the simplest form of injury to the brain characterized by an immediate, generalized loss of consciousness. Contusion is a more severe type of injury characterized by being progressive and a tendency for localization. Etiology of head injuries is well known. At present the automobile has increased the cause of head injuries over 300%. Injuries may be due to falls, blows, bullets, aeroplanes, etc. The diagnosis of the different types of injury is very important from the therapeutic standpoint. I think that there has not been sufficient attention given to the careful examination both on admission and the following twelve to twenty-four hours after entrance into the hospital. Very frequently when a patient is sent to the hospital with a head injury the first thing the doctor is concerned with is, "Is there a skull fracture evident?" The

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patient is then hurriedly sent to the x-ray department. Many a patient has been killed or at least his death has been hastened in this way by the carelessness of the doctor, and the roentgenologist indirectly, because he is just fulfilling the doctor's request for a picture. Injuries to the skull alone never produce serious trouble unless the fracture is a depressed one, and so, of what advantage is the x-ray if it does reveal a linear fracture of five or six inches long, if unless from a medico-legal standpoint. The examination of the patient will tell the doctor immediately as to the type or intensity of a head injury. The things that we are very much concerned in are:

1. Pulse: Is it rapid and thready as in shock; or is it slow and irregular. Usually below 70 is indicative of increased intra-cranial pressure.

2. Respiration: Very slow and irregular (Cheyne-Stokes) as in intra-cranial pressure, or very rapid as in shock.

3. Temperature: As the intra-cranial pressure increases, the temperature rises and when above 102 it is a grave sign.

4. Blood Pressure: This should be recorded every half hour, for the first few hours and then every hour because it is of great diagnostic help. If the patient is admitted in shock the blood pressure will be subnormal, but as the intra-cranial pressure increases the blood pressure rises until when medullary compression occurs it begins to fall.

Concussion, which is the simplest form of brain injury, is characterized by an immediate generalized unconsciousness from which the patient may or may not be aroused; this varies from a stuporous condition to coma, and is usually followed by dizziness and headache. This may soon be followed by nausea or vomiting and some disorientation. There may or may not be a skull fracture present. There is very little rise in the intra-cranial pressure. Recovery may follow after a brief interval; this is often seen in boxers and is frequently known as "punch drunk." Deep reflexes may be lost or diminished. If the injury is severe, i.e., basal skull fracture, there may be associated with it concussion, contusion, or laceration of the brain. Such an injury is diagnosed by bleeding from the ears, nose or mouth. There may be an escape of spinal fluid from the ears or from a wound in the skull. Ecchymosis of the eye or mastoid swelling may be present. As the intra-cranial pressure increases edema of the brain becomes more intense. This may be detected early by the measurement of the spinal fluid by the mercury manometer. Normally it is up to 12mm. and over 30mm. is a dangerous sign. Of next greatest diagnostic value to the mercury manometer for determining increased intra-cranial pressure, is the ophthalmoscopic examination of the fundi. In the first five to six hours following an injury no changes may be noted in the fundi, but soon dilatation of the veins of the retina and a blurring or haziness of the margins of the discs may be noticed. As the pressure increases the disc becomes hyperemic and edema appears over the nasal half of the disc. Choked discs appear very late and it is a terminal finding. The deep reflexes are usually absent or diminished. Localizing signs should be noted, i.e., paralysis of a leg or arm or facial involvement. Unilateral dilatation of a pupil usually denotes a cerebral hemorrhage on the same side as the dilatation. Dilated fixed pupils are a poor prognostic sign; constricted fixed pupils are usually due to hemorrhage of the pons and medullar compression.

Middle meningeal hemorrhage results from tearing of the vessel following skull fractures. It does not occur as frequently in children because of the ability of the skull to mold itself. A hemorrhage may be extra-dural or sub-dural. The amount of blood escaped is not what kills a patient, it is the degree of compression and edema of the brain. Usually as the hemorrhage spreads, focal signs may be elicited, i.e., paralysis of an arm, leg, or of the face; increased reflexes on the same side; and finally, convulsions. The history of a lucid interval of consciousness, followed in a few hours by unconsciousness is usually diagnostic of middle meningeal hemorrhage.

The pathology of head injuries is still not definitely settled. In cases of concussion that die nothing may be found microscopically. In the severer forms of concussion or contusion petechial hemorrhages may be seen in the cortex. The brain may be lacerated and edema is a very frequent finding. The perivascular and pericellular spaces are edematous, the brain is wet; changes may be noted in the choroid plexis and

ependymal cells of the ventricles. The choroid plexus shows vacuolization. The ependymal cells show an increase in length with edema. An increase in the perivascular and pericellular spaces in the cortex may be seen. Complications which may follow are: 1. Septic meningitis, 2. Brain abscess, 3. Epilepsy, 4. Post traumatic neurosis or psychosis.

Treatment, of course, will depend on the condition of the patient and the amount of cerebral damage. Upon admission the patient should be put to bed immediately, and kept very warm. If shock is present he should be given hypodermoclysis about 1,500 cc. of saline and 150 grams of glucose. Morphine should not be given in any head injury, first, because it masks the picture clinically, and second, because it depresses the medullar center which is already depressed. If there are any signs of increased pressure such as, restlessness, bradycardia, stertorous respirations, and the rising blood pressure, hypertonic solution should be started; 50% magnesium sulphate—150-200 cc. should be given as a retention enema every 3 hours. 50% glucose—50-100 cc. may be given intravenously every 6 to 8 hours. Paraldehyde, chloral hydrate, and bromides are safe hypnotics to use. As to spinal puncture, this is still a point of dispute. There are two schools—one advocating repeated spinal punctures every 6 to 8 hours as the pressure is increased, and the other treating the pressure on a physiological basis and reducing it by the hypertonic solutions of magnesium sulphate, glucose, or sodium chloride. I feel that spinal puncture is a dangerous procedure; very frequently the sudden release of fluid allows the medulla to suddenly become impinged in the cysterna magna, or, in cases of hemorrhage, where nature has sealed off a bleeding point by a clot wedged in by the spinal fluid, a sudden release of the fluid allows the clot to become loosened and hemorrhage is started again. We feel a puncture is indicated when the temperature rises over 103 degrees, or in the presence of convulsions. Stimulants, i.e., caffein and adrenalin, should not be given. If a patient dies in the first six hours usually nothing can be done because of the severe injury to the brain.

After shock is combated, which occurs after five or six hours, a patient may be moved with safety for an x-ray. Regardless of how trivial a head injury may be, it should be seriously considered as a brain injury and the patient should be kept in bed under quiet conditions for at least two weeks, and as long as six weeks if necessary.

A laceration of the scalp should be debrided, hair about the wound shaved, and the wound sewed up tight if seen early. Drains are not necessary. Depressed skull fractures should be elevated as soon as the condition is safe. A decompression should proceed this procedure. In cases of hemorrhage, a subtemporal decompression should be performed with removal of the clot. Children stand injuries much better than adults since their skulls are not such a solid casement and yield more easily to injuries; thus the mortality of children is half as great, about 15% to 16%, whereas in adults it is about 31%. Just a word about headaches that persist due to adhesions; the use of lumbar insufflation, which is the removal of fluid and replacement of air, has been of great aid. I have had no experiences except that I have seen patients develop excruciating headaches after insufflation of air for ventriculography.

In conclusion, I would like to mention a series of skull injuries that I have collected for the past three years from the Woodlawn hospital. There were 41 cases of head injuries, 22 of which were considered as skull fractures, having definite signs and symptoms of injury to the brain; a mortality of 18.5%, which is probably half of the mortality that one sees in an institution, as I was able to observe while I was associated with the Cook County Hospital. This decrease in mortality may be due to the type of patient that one sees in private practice. Post traumatic neurosis is a very sad phase of pathology. An early settlement of the case will bring happy results very frequently.

826 E 61st Street.

REFERENCES

1. Vance, B. M.: Fractures of the Skull, Arch. Surg., 14:1023, 1927.

2. LeCount, E. R. and Apfelbach, C. W.: Pathologic anatomy of traumatic fractures of the cranial bones and concomitant brain injuries, J. Am. M. Assn., 74:501, 1920.

3. Apfelbach, C. W.: Studies in traumatic fractures of the cranial bones, Arch. Surg., 4:434, 1922.

4. McClure, R. D. and Crawford, A. S.: Management of craniocerebral injuries, Arch. Surg., 16:451, 1928.

5. Virchów, R.: Hematoma Durae Matris, Verhandl. d. phy.-med. Gesellsch., 7:134, 1857.

6. Jackson, H.: The management of acute cranial injuries by the early exact determination of intracranial pressure and its

relief by spinal puncture, Surg. Gynec. Obst., 34:494, 1922.
7. Sharp, W.: Observations in the diagnosis and treatment of brain injuries in adults, J. Am. M. Assn., 66:1536, 1916; Diagnosis and Treatment of Brain Injuries, New York, J. P. Lippincott, 1920.
8. Gunn, M. L.: Eye observations in fracture of the skull and severe head injuries, Kentucky M. J., 27:119, 1929.
9. Holbrook, F. R.: The diagnosis and management of head injuries, J. Am. M., Assn., 83:489, 1924.
10. Sachs, E.: Fractures of the skull, S. Clin. N. Amer., 2:1571, 1922.
11. Quincke, E.: Diagnosis and therapeutics of lumbar puncture, Deutsche med. Wchnschr., 31:1825, 1905.
12. Sachs, E. and Belcher, G. W.: The use of saturated salt solution intravenously during intracranial operations, J. Am. M. Assn., 75:667, 1920.
13. Peet, M. M.: Reduction of increased intracranial pressure by intravenous administration of glucose and hypertonic Ringer's solution, J. Am. Assn., 84:1994, 1925.
14. Howe, H. S.: Reduction of normal cerebrospinal fluid pressure by intravenous administration of hypertonic solutions, Arch. Neurol. Psychiat., 14:315, 1925.
15. Fay, T.: The control of intracranial pressure, J. Am. M. Assn., 84:1261, 1925.
16. Dandy, Walter: Head Injuries, Ill. State Med. J., May, 1931.
17. Rand: Pathological changes following head injuries. Arch. Surg., May, 1931.

THE FEVER TREATMENT OF PARESIS BY MEANS OF THE DIATHERMY CURRENT AND THE ELECTRIC BLANKET*

SIDNEY D. WILGUS, M.D., and
LEAH LURIE, M.D.
ELGIN, ILL.

The importance of fever as a therapeutic measure in neuro-syphilis has been emphasized within the past few years. The literature shows various recent developments in producing fever, as follows: 1. Hot baths; 2. Injections of foreign proteins (as typhoid vaccine, milk, peptone); 3. Injections of a chemical (sulphur in olive oil); 4. Infectious type as (a) malaria, (b) rat bite fever; 5. Hot air; 6. High frequency currents (Diathermy); and lastly by the electric blanket. In this paper we wish to discuss the last two.

Diathermy fever has the advantage of being produced without the injection of infectious or toxic substances. The rationale of the treatment is based on the following.

The constant temperature in warm blooded animals is maintained by the thermostatic mechanism which is a two fold mechanism, capable on the one hand of regulating heat production; on the other hand of regulating heat dissipation. To overcome nature's thermostatic mechanism all precautions are taken to eliminate heat dissipation and, at the same time, in diathermy, to pass high frequency currents through the body of the patient and by this means produce an excess of heat, which raises the internal temperature.

Before starting the use of diathermy treatments on human patients certain research work was done on animals, and Dr. Mortimer[1], establishing the primacy of heat in this form of treatment, summarizes his results as follows: The effect is explained on the basis of heat production. Long continued sublethal doses given to rats and dogs are without ill effects. The lethal effect of these currents can be accounted for on the basis of over heat production. In live dogs the different organs heat up at approximately the same rate, the blood serving as an efficient distributing mechanism.

With knowledge of the foregoing in mind in latter 1929, and at the request of Dr. Ralph T. Hinton,† then Managing Officer, Elgin State Hospital, and encouragingly continued by his successor, Dr. Chas. F. Read, of that hospital, we undertook the treatment of paretics with the diathermy current as it was then getting under way at the hospital. This has continued to date and to that method of treatment and also at the request of Drs. Hinton and Read the method by the electric blanket was added.

Technique: Diathermy machines made by a leading manufacturer, are used. We use tinfoil electrodes with sponge rubber back, originated by Dr. C. W. Cocke and Dr. Cash King.[2] The patient is wrapped in rubber sheets and blankets. The current is slowly but gradually increased to reach its maximum in twenty minutes. The pulse, respiration, and temperature are recorded every fifteen minutes. The temperature rises very slowly at first; but after the first half hour the rise is more rapid reaching 104° in approximately 2 hours.

The current is turned off at 104.5-105 degrees by mouth or 105-106.1 by rectum. The temperature often rises five-tenths to one degree or more after the current is cut off. It then falls slowly. The rapidity with which the

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*From Elgin State Hospital and The Illinois State Psychopathic Institute.

†Mrs. Hinton was the first person to be given this form of experimental fever.

temperature of the patient returns to normal depends upon the amount of covering allowed to remain save in certain rare cases in which the temperature begins to rise again after the drop has begun. This must be looked for in each treatment and remedies applied when demanded to prevent heat stroke. After the treatment the usual patient goes to sleep for an hour or more. On awakening a cooling bath is given and thereafter the patient dresses and resumes his regular affairs of life none the worse for wear.

Findings. Ninety-seven unselected patients with general paralysis received a series of twelve treatments each, given every other day with the temperature kept at 104° or above for at least one hour. Each time patients lost about 5 pounds, but this was regained before the next treatment and at the last showed little change. The final Basal Metabolic rate presented no important changes. Blood picture and chemistry negative. Blood pressure, heart and kidney diseases presented no contra-indications; occasional showers of casts at first aroused apprehension, but we found that omission of treatment for a day or two met the situation. The Wassermanns were not often affected immediately though they may alter even after months and years, as shown by the Von Jauregg malaria literature; the Lange reaction frequently showed a change almost at once; in 27% from paretic to luetic curve; in 24% flattening down. The cell count in the spinal fluid often showed marked improvement; in 22% of the cases a high cell count was reduced to normal at the end of the treatments. Globulin when present before treatment persisted after, but in many cases with marked reduction.

The clinical picture and the serological improvement (cell count, globulin, colloidal gold) do not necessarily correspond; serological improvements occur in some cases not improving clinically and vice versa. However, investigators with malaria find clinical improvement may come at much later dates.

We use Hauptmann's[3] modifications of Walter's original method for the determination of meningeal permeability from the blood to the cerebrospinal fluid. The permeability decreased, i.e., returned toward normal, after the treatments in almost all the patients who showed clinical improvement.

Clinical results: As against the expected spontaneous remission rate of 3.5%, in 97 paretics treated we found: 55% much improved; 17% slightly improved; 23% unimproved; 6% died due to progress of disease. 18% of the improved group are at home, and more, awaiting business improvement, will follow. The type we find best for treatment is the exalted type and particularly cases of recent development. Cases from other groups improve less uniformly. Nevertheless we believe that all cases should receive treatment.

Pathology. The brains of our deaths have not yet been examined. Bassoe[4] and others report that after malaria they find "regression and even arrest of the pathological processes proportionate to the clinical remission." Breutsch and Bahr[5] report the same findings. Ferraro[6] draws enlightening conclusions based on findings in 29 autopsies held on the brains of paretics dying after treatment by malaria. One group includes those in which the effect of the fever has been fairly complete resolution of the inflammatory products (mesodermal) of the meninges and brain.

2. Again there often is a limited degree of improvement only, due to the previous destruction of brain cells.

3. A group which includes a considerable number of cases going into definite remission but in which the sypmtoms return, and then the disease proceeds to run its usual downward course. The reason why, after a remission, the disease returns, it is explained by Ferraro that there is a third pathology in paresis, namely, a chemical pathology with eventual destruction of the ectoderm (parenchymal) cells in the absence of inflammatory mesodermal reaction of note. Thus in this group the inflammatory products are cleared up and for a time the patient is better, but after a certain interval of weeks of remission, the chemical change brings mucoid degeneration within the cells, death of the cells, and rapid mental deterioration.

Neurologicals: There is not often great alteration in the neurological signs. Tissue destruction evidently antedated treatment.

Deaths: Not one died directly or indirectly as the result of the diathermy treatments. One died three weeks after the last treatment; the rest (4) died two to five months after.

Conclusions: 1. All fever treatments are beneficial in paresis, so there can be only one therapeutic agent common to all, namely, the fever. 2. The beneficial results from diathermy compare well with those obtained from fever from other sources. 3. In diathermy we have a method by which without using infectious or other deleterious toxic substances, fever is produced under maximum control and safety. 4. This treatment may be accompanied with or followed by other anti-syphilitic treatment (as recommended in malaria by Von Jauregg and others) although Breutsch and Barr[5] claim as good results without this addition. 5. Male paretics handle better to this treatment than female paretics. 6. In the main the above findings confirm those made by other writers on diathermy.

THE ELECTRIC BLANKET

This paper will now introduce the subject of the electric blanket method of producing fever. Suffice to say that thirty-one patients received about the same number of treatments as the diathermy cases. The method is easy inasmuch as the patient is simply placed in a large electric blanket with two-stage (2400 milliamperes + 5000 m. a.) control of the current. The patient is also wrapped in ordinary blankets and rubber sheets for the purpose of preventing shorts and secondly for the more easy production of fever. We use it 1 hour and then turn it off for ten minutes and so on throughout the treatment. At 102.8° the current is shut off; thereafter the fever rises to 105° or 106°; after 1 hour of this maximum we begin to unwrap. Thus is developed the exact five hour fever curve of diathermy and other treatments with absolute safety and accuracy.

With thirty-one patients completing treatment, the results parallelled very closely those produced by diathermy. As in diathermy 5% died but without relation to treatments save one passing into convulsions at the height of the first treatment.

One death illustrating Ferraro's[6] third group records a remission that mysteriously did not hold. F. G., age 37, showed 4 years of symptoms, 16 months of idleness, and 6 months of hospital residence. Was irritable, memory impaired; emotionally unstable, occasional convulsions; feeble and hospitalized. Was given twelve diathermy treatments. After these was up and about, going to entertainments, etc., and even had a parole of the grounds. He had no more convulsions. In brief, his remission was well marked. This went on for three months when he had a convulsion and died in three days. We witnessed others of this type.

DISCUSSION

(A) Apparently the spirochaetes are not killed by our fever of 105° or 106°, but require 108°F[7] to 125°F[8] for this purpose.

(B) Yet the strain may be damaged in approximately 70% of cases, i. e., changed from a malignant to a more benign form[4] as suggested by the frequent slow reduction of the Wassermann intensity; also by the pathological improvements reported by many observers. But do the spirochaetes here finally die and their pathology disappear? Findings suggest this in some of the favorable cases. In others decidedly not, as shown by our illustrative case going into well marked remission and then weeks later suddenly dying in convulsions as a result of the progressive intracellular changes described by Ferrarro.

(C) The fever had no effect on 5% of our cases. Some mesodermal cases were too advanced for successful treatment and in some no doubt fatal intracellular chemical changes occurred. This percentage is common to other forms of treatment.

(D) At any rate a frequent though partial change in the spirochaete occurs almost immediately for we find spinal fluid changes very early, often after two or three treatments only. Remissions continue over prolonged periods as a rule.

(E) But may not the strain once damaged become rejuvenated if the treatment be stopped too soon? The answer is not clear now.

(F) The immediate changes are not always beneficial as shown by our one case going into status at the height of the first treatment and dying in a few hours. Was this lethal result due to an irritating disturbance of the grouped spirochaetes? Or to a sudden increase of toxic discharge from them in their discomfort? Or both? We may speculate on the proper reply.

(G) The fever height seems of importance and we certainly would expect this the fact. For

this reason we desire to maintain the highest possible fever compatible with health.

(H) A considerable group improves to a certain point and then ceases to advance further. Probably regeneration in this group has gone as far as is possible, but falls short of a complete result owing to previous destruction of non-replacable ganglion cells.

(I) Permeability test results suggest the fever brings organic changes, but if so, what? Probably the reticulo-endothelial changes of Breutsch and Bahr or some other similar process.

Conclusion: At any rate the fever is the important therapeutic agent and we are ready to go on record as saying that the electric blanket, while not spectacular, is simple, safe, and efficient, and, in our opinion, is superior to any previously used method of fever production.

750 South State Street.

BIBLIOGRAPHY

1. Mortimer, Bernard: Radiology-May, 1931.
2. Cocke and King: Journal Southern Med. Assoc., March, 1930.
3. Hauptman as quoted Arch. Neur. & Psych. Oct. 1928.
4. Bassoe, Peter: Ill. M. J. Aug., 1926.
5. Breutsch, W. L., and Bahr, M. A.: J. Nerv. & Ment. Dis. 67: 209-223 (March, 1928).
6. Ferraro, Armando: Arch. Neurol. & Psych. Jan., 1929. "Pathol. Paresis after Treatment Malaria."
7. Dattner: J. A. M. A., 2-28-31, p. 705.
8. Jordan: General Bacteriology, 7th Edit. p. 505.

FRACTURES ABOUT THE ELBOW JOINT

HARRY D. GROSSMAN, M.D.

CHICAGO

In dealing with fractures about the elbow joint, several normal anatomical facts must be borne in mind. With the forearm extended, the tips of the external and internal condyles and the olecranon all lie in the same straight line, whereas with the forearm flexed, the tip of the olecranon forms the apex of a triangle, the base line being that connecting the two condyles. Furthermore, it must be remembered that the axis of the forearm forms an angle of approximately fifteen degrees with the axis of the arm so that with the upper extremity at the side of the erect body, the forearm is directed outward and downward producing the so-called "carrying angle."

Also some knowledge as to muscle attachments is of value as these help produce displacements in fractures. The flexor tendons of the forearm and hand take their origin from the internal condyle and the extensor tendons from the external condyle of the humerus. The triceps is inserted into the tip of the olecranon and the biceps into the bicipital groove on the radius.

Of course, fractures about the elbow do not necessarily occur singly but any combinations may occur and these with or without dislocations. However, in a discussion, it is better to consider each type individually and to determine the picture of an uncomplicated fracture. The various types may be conveniently classified as follows:

A. Fractures of the humerus:
   1. Transverse supra condylar
   2. T or Y shaped
   3. External and internal condylar
   4. Fractures in the neighborhood of the lower epiphysis

B. Ulnar fractures:
   1. Olecranon
   2. Coronoid process

C. Radial fracture:
   1. Head
   2. Neck

The various forms of breaks about the elbow joint may be produced by direct violence as a blow or fall on the flexed elbow, but indirect force, as that occurring with a fall on the outstretched hand with the forearm extended, may also produce a transverse supracondylar fracture, separation of the epiphysis or a break in the external condyle. Muscular action of the triceps may occasionally cause a break in the olecranon at its place of insertion.

In the transverse supracondylar fracture, the break is usually one to two inches above the joint. The lower fragment is most always displaced backward and pulled upward by the triceps drawing up the ulna, so that there is an angular deformity posteriorly. Occasionally the lower fragment is displaced anteriorly when the fracture occurs by direct violence and then there is apparent lengthening of the forearm with loss of prominence of the olecranon.

In T or Y shaped fractures, the lower limit of the line of fracture usually extends into the elbow joint. With complete separation of the condyles, there is widening of the elbow and crepitus. With incomplete separation, no deformity results.

Condylar fractures are usually intracapsular, although some involving the internal condyle

may avoid the joint. In those of the external condyle, the lower fragment is rotated forward and moves with crepitus, independently of the humerus. In the internal condyle intracapsular type, the fragment is pulled upward and backward and the ulna goes with it due to the triceps pull; on extending the forearm, the olecranon appears more prominent and the lower end of the humerus is dislocated anteriorly with the forearm slightly adducted. In the extracapsular type occurring before the age of 19 years, epiphyseal separation may occur with downward displacement of the fragment. The ulnar nerve may be injured in condylar fractures.

In fractures near the epiphysis and in epiphyseal separations in young children, the displacement is backward and laterally.

Olecranon fractures usually are transverse and occur at the base. Unless the tendinous and periosteal coverings are also torn, there is no deformity. When the process is completely severed, the fragment is pulled up by the triceps away from the ulnar shaft. The bones of the forearm are pulled forward so that a sulcus is felt between the detached olecranon and the ulna which becomes greater on flexion of the forearm.

Breaks through the coronoid process are rare, and when they occur accompany a backward dislocation of the ulna. Clinically the diagnosis is suggested by the fact that this dislocation of the ulna reduces more readily than an uncomplicated one and with crepitus, and is more difficult to keep in place.

Radial fractures through the head cause no deformity unless the orbicular ligament be torn; the head remains immovable when the ligament is lacerated, but crepitus may be obtained by rotating the lower part of the radius.

Fracture through the neck occurs between the orbicular ligament and the bicipital tuberosity. The lower fragment is pulled up and anteriorly by the biceps and is more prominent on trying to flex the forearm. Loss of rotation also occurs and the head does not move on passive rotation.

The usual signs of fracture, such as swelling, discoloration, tenderness over the line of fracture, severe pain on trying to move the parts, are all present usually and at times crepitus with preternatural mobility may also be found. X-ray examinations should be made in all cases with antero-posterior and lateral views, both before and after setting.

In uncomplicated fractures of the humerus the relations between the olecranon and the condyle remain the same, whereas in dislocations these are altered. Also in dislocations, the measurements from the external condyle to the styloid process of the radius is shortened, but is unaltered in fracture, although the length of the arm from the deltoid tubercle to the outer condyle is unaltered in dislocations and shortened in fractures. In fractures, deformities reduce fairly easily, with crepitus, but tend to recur readily, whereas dislocations reduce with a little more difficulty but do not recur so easily after reduction.

Whenever there are small loose fragments in any of these breaks, or when there is definite widening of the elbow due to complete separation of the condyles, or when the olecranon does not reduce properly, open operation is advisable. Approximation of the parts is accomplished either by bone pegs or wiring. Small fragments of bone are removed and at times the radial head may require removal.

All other fractures except those of the olecranon are reduced by traction downward and then completely flexing the forearm on the arm, with the forearm in supination. This position is maintained by bandaging the extremity in flexion protecting the creases by cotton and powder and supporting the extremity in a sling. In olecranon fractures, the forearm is extended on the arm and supinated and an anterior splint applied.

While the bones are healing, it is advisable to see that shoulder, wrist and finger joints are moved daily to prevent stiffness. After ten to fourteen days massage over the site of the fracture may be started and if no pain results, also slight passive motion. Extension, by degrees, of the flexed forearm is allowable, after eighteen to twenty-one days, up to the point of pain so that gradually the angle between the forearm and arm increases. The reverse holds true for olecranon fractures. Gradual flexion is started after three weeks.

Active motion in the elbow joint is encouraged after the third week and usually by the fourth week the sling may be discarded and grad-

ually increasing amounts of exercise be given to the parts until they approximate normal.

4706 Cottage Grove Ave.

THE RELATIONSHIP BETWEEN MENTAL DEFICIENCY AND THE FIELDS OF GENERAL MEDICINE*

GROVES BLAKE SMITH, M. D.
Superintendent, Beverly Farm, Incorporated
GODFREY, ILLINOIS

The recent White House Conference on Child Health and Protection has pointed out not only the needs of the mentally retarded and the feebleminded, but also the responsibility that rests upon the community to adequately supervise and treat such problems.

At least 2% of our population falls in that group of idiots, imbeciles, and morons who are socially inadequate to meet the complex life of today. Illinois has, therefore, over 125,000 mentally deficient of whom only 5,400 are being cared for in an institutional environment. Do these figures not demand that the medical profession take an active interest in preventing, when possible, this economic burden, as well as altering the family maladjustments and relationships that too often ensue from ill-advised recommendations and plans.

Mental deficiency is not a clinical disease, but a syndrome consisting of organic neurological changes in brain structure, generally associated with structural changes in the body as a whole which result in limitation or even lack of normal mental development, as manifested by intellectual deviation as well as inadequacy in meeting social demands. We are, therefore, no longer content to look upon heredity as playing a major role, although in those families where social maladjustment, because of mental deficiency, can be shown to be a family trait through more than one generation, preventative measures, such as segregation through the child bearing period or selective sterilization, is in order. Sterilization should always be reserved for suitable cases as it is not a cure-all for mental deficiency. Defectives who remain in the community either on parole from the state school or special classes in the public schools have a right to social adaptation, and selective sterilization often makes this possible. The male is by nature homosexual and the crimes of rape, etc., can usually be credited to psychopathic personalities rather than to the mental deficient. The female, likewise, rarely assumes an active role so that her entrance into the fields of prostitution and child bearing is the direct result of exploitation and failure, on the part of the environment, to provide her with adequate safeguards.

The duty of the family physician is three fold, namely, to the patient, to the family, and to the community. In as much as the family physician is the first to make contact with the problem at the birth of the child it is imperative that steps be taken to prevent those factors which play a secondary role in the causation through prenatal influences. A duty also devolves upon him to use wisdom and care in the use of instruments and the use of pituitrin, for the growing number of birth injuries testify to the fact that a certain number of these cases are preventable. The recognition of syphilis as a causative factor for mental deficiency should not be overlooked in cases where syphilis exists within the family. Ascribing syphilis as a major cause of mental deficiency is without foundation, as untold studies have shown the percentage of syphilis among the mentally deficient to be no higher than that in the population in general. The offspring of luetic parents have at least 20% of the chances of showing signs of mental retardation, and the degree of mental deviation is in direct proportion to the adequacy of treatment.

During the early developmental period certain landmarks stand out as pointing to delayed and altered development. Alterations in the ability to nurse, cyanosis at birth, slowness in sitting, walking, talking, and alterations in muscular control are all diagnostic factors that show that some abnormal feature is playing a part. A more careful and rational diet program in these cases of delayed development will do much to overcome the deficiency diseases which tend to thrive with these alterations in mental and physical deficiency. The birth injury group, in particular, should not only receive careful checking, but should have the benefit of orthopedic supervision in the prevention of muscular deformities and muscle wasting. The need of muscle re-education is important particularly where it involves

*Address before Section on Public Health and Hygiene at annual meeting of Illinois State Medical Society at East St. Louis, Ill., May 5, 1931.

the pyramidal tracts as well as the extra pyramidal and basal ganglia group of syndromes. Many individuals who would otherwise be bedridden invalids, due to contractions, can be salvaged if these early measures are carefully watched.

Physical and secondary mental improvement are noticed in those cases where attention is paid to focal infection, whatever its source, including constipation, due either to disease or faulty habit mechanisms. There is nothing, however, that will justify the belief that we can alter the inherent underlying degree of deficiency, through changing these.

The use of endocrine medication, other than that of thyroid derivatives in cretinism, is a controversial subject. The optimism of many, where such states have been unaccompanied by adequate controls, is unwarranted, but it is felt that hope lies in the development of further products which may be of value.

Of great importance in the group of retarded children are alterations in the visual and auditory mechanisms of the child. Sufficient attention has not been paid to the detection of the minor types of aphasia, word-blindness and deafness, the result of cortical atrophy or injury. Too often this group of patients is classed as one of primary retardation when they are, in reality, deprived through the alterations in development and training of these special senses.

Passing from the purely physical aspects, we desire to call attention to changes that have taken place in the psychiatric angles of the deficient personality. The necessity of the early development and guidance of the habit mechanisms and habit patterns of the pre-school defective will do much toward enabling the individual in making satisfactory adjustments, not only in the family circle, but in the special class or institutional environments as the case may be. The guiding principles, which have been laid down for the average normal child are equally good for the mentally deficient, for the same emotional stresses and strains bring about abnormal family relationships. The behavior reactions of the mentally deficient are often not so glaring and outstanding, hence are often overlooked. In the main they result from the restrictions of activities and contact with a normal family life to the more prevalent environment of over-solicitousness and over-protection. There is definite need of a more careful working out of these behavior types, particularly as they constitute the outstanding problem of pediatric supervision in the home care of the younger child.

Not only are the minor behavior mechanisms of importance, but the presence of major psychotic episodes are much more frequent than we have realized. The correlation of the body types of Kretschmer with psychic abnormality, have their counterparts in the mental defective as well as in the insane. These aspects need more careful study before more definite generalizations can be made. The major question of the defective delinquents and delinquent defective emphasize the need of careful correlation of these conditions with the psychopathic personalities of everyday life. Toxic mental states are of major importance and often accompany the ordinary disease processes. They often result from dehydration and undernourishment, as well as the inability of the mental defectives, particularly the idiot and the imbecile, to fully make known their wants. Care of these latter groups must therefore be carried out along established routines.

The presence of cyclothymic episodes are quite frequent but, unfortunately, the hypomanic responses do not receive the benefit of hydrotherapy but are often made worse by too much sedative medication. The schizophrenic states often present bizarre pictures when superimposed upon defective syndromes. The fact that the degree and nature of the hallucinatory and delusional responses are not as well marked and that the symbolic characteristics are much more infantile does not prevent our making such a diagnosis. The involutional pictures do not show the same degree of depression and are more apt to be followed by an increase in the childishness of the individual upon clearing. The confusion and the slowing of mental response is more apt to persist as a residual finding. The onset of the arteriosclerotic changes are not nearly so noticeable and must be regarded as more an evidence of general deterioration of mental and physical factors, rather than a characteristic syndrome.

I desire to emphasize, both for the protection of the child and the family, that the family physician should place a true picture of condi-

tions before the parents. This prevents the unwise expenditure of large sums of money for useless medicine, observations, and treatment, and likewise offers the child an opportunity to development, educationally and socially, in accordance with its background. Experience has shown, only too often, that the future hope of families are too often wrecked through attention being paid to the mentally retarded child, so that opportunity to carry on is denied the normal members of the family. The family must early be informed that they are face to face with a problem that will require the use of special classes, in communities where such exist, the use of private schools, in cases where special funds are available, and also that entrance to the state schools at an early age is imperative where any other financial program would lead to disaster. It is important to realize that the earlier the training and education of these individuals, both in habit mechanisms and handicraft, the greater their ability to carry on in a social way. Our future hope lies in the realization that the mentally deficient, of necessity, are not an economic loss, but that with proper training and supervision they can be made social assets. This requires, on the part of the community, a definite program: First. The recognition of the degree and character of deficiency through psychological and psychiatric examination. Second. A means of education through the development of special classes and particularly a vocational placement after such training. Third. An expression of tolerance on the part of the individual community to feeling that they have a definite duty toward the mentally handicapped.

The physician as a leader in community viewpoint, can do much toward bringing about an understanding of the needs of the mentally retarded. Communities in which there is tolerance and a willingness to assume responsibility and understanding offer the utmost in the way of adequate supervision for those who have been properly trained through a special school and institutional work. When approached from the standpoint of ignorance or unwillingness to be bothered the mentally deficient are being taken advantage of. The blame for his delinquency and his maladjustment should be placed upon, not him as such, but upon the community that has not given him the proper chance. The physician has a definite duty to society in recommending to his patients that the state program is handicapped, as a rule, not through inefficient plans but due to lack of proper financial means to carry these plans out.

Educators, psychologists, and special school teachers have met their responsibilities in devising ways and means to bring about intellectual improvement, but the medical profession has shown marked indifference in neglecting the opportunities which have been offered in the way of personal studies. To adequately get an understanding of the problem, research investigations should be carried out in all of our medical schools and state institutions. In recent years the attention of the community has been focused upon the educational aspects of the deficient through the widespread approach of mental tests. This, however, does not belittle the fact that mental deficiency as such, is primarily a medical problem to be met and faced through medical means, and that it is only through proper research channels that we can look for an intelligent unbiased attack upon the problem.

TREATMENT OF NEPHRITIC EDEMA BY ACID

F. H. Lashmet, Ann Arbor, Mich. (*Journal A. M. A.*, Sept. 26, 1931), calls attention to the fact that it has been known for a long time that in the clinical state of edema there is an excess of water and of chlorides in the body. In the case of nephritic edema it has been assumed that the damaged kidneys were unable to excrete these substances and that this was the cause of the retention. Accordingly, it has been customary to restrict sharply the water and sodium chloride intake in the treatment of this type of edema. But, *a priori*, the retention of body water and chlorides may be as easily explained by assuming that the body tissues hold them and that they were never presented to the kidneys for excretion. Obviously, it is important to determine which of these hypotheses is correct, since the treatment based on them is entirely different for each. Experiments were undertaken to determine whether nephritic edema is actually influenced by (*a*) fluid intake, (*b*) chloride intake, (*c*) total ash intake or (*d*) reaction of the ash. The patients tested had chronic nephritis with edema. The degree of edema was recorded in terms of body weights. Examples of the results obtained are demonstrated by charts. On the basis of his observations the author concludes that edema is not due to the failure of the kidneys to excrete water and is independent of the fluid intake. Edema is not due to the failure of the kidneys to excrete chlorides. Chloride as sodium chloride increases edema but as hydrochloric acid or ammonium chloride decreases edema. Appar-

ently, the reaction of the compound is more important than the chloride content as such. The reaction of the total ash intake is more important in influencing edema than the total amount of ash. Alkaline ash intake increases edema and acid ash intake decreases edema. In the treatment of nephritis edema, the author has used, during the past two years, a low protein, "salt poor" diet, with a neutral ash, to which are added acids or acid producing salts. The fluid intake has been "forced" rather than restricted. The clinical results have been very satisfactory.

INORGANIC SULPHATES IN SERUM IN EARLY RENAL INSUFFICIENCY

E. G. Wakefield, M. H. Power and Norman M. Keith, of Rochester, Minn. (*Journal A. M. A.*, Sept. 26, 1931), made a study of the significance of inorganic sulphates in the serum in early renal insufficiency by comparison with tests of renal function which are employed in the treatment of renal disease. They summarize their results as follows: (1) Inorganic sulphates in the serum are increased before there is retention of either urea or creatinine; (2) inorganic sulphates in the serum are increased usually before there is lowered excretion of phenolsulphonphthalein, and (3) in about half the subjects studied, sulphates were elevated in the serum before the kidney had lost its ability to concentrate urine to a specific gravity of 1.025 or more in the concentration test; also, the kidney might be unable to concentrate urine to 1.025 and the sulphates would be within the normal range of concentration. There was a fairly close agreement between the increased concentration of inorganic sulphates in the serum and the test of blood urea clearance as a measure of renal functional activity. From this study it is apparent that there may be definite renal disease and yet all the tests of renal function may be within the limits of the normal variations. The variations in the tests of renal function indicate that there are probably separate mechanisms of excretion of the various substances.

RELATIONSHIP OF DISORDERS OF DIGESTIVE TRACT TO ANEMIA

William B. Castle, Clark W. Heath, Maurice B. Strauss and Wilmot C. Townsend, Boston (*Journal A. M. A.*, Sept. 26, 1931), present a complete chain of evidence for the substantiation of the hypothesis that pernicious anemia is a deficiency disease resulting not from a direct inadequacy of the diet but from a conditioned deficiency produced by the failure of some function of the normal stomach to take place in the stomach of the patient with pernicious anemia. This reaction, in normal individuals has to do with the manipulation of protein and leads to the absorption of a factor necessary for the maintenance of normal bone marrow activity. In general, disturbances of the gastro-intestinal tract of various kinds may interfere with absorption or with processes necessary for the proper metabolism of food substances essential for the normal functioning of bone marrow. In this way, even in the presence of a normal diet, disturbances of the digestive tract may condition a deficiency of nutrition, in particular of substances essential for blood formation.

TREATMENT WITH MALARIA AND ACQUIRED ANAPHYLACTOID REACTION TO QUININE: SUCCESSFUL USE OF QUINIDINE

Benign tertian malaria in a patient with acquired anaphylactoid reaction to quinine was successfully treated by J. P. Sanders, Caspiana, La. (*Journal A. M. A.*, Sept. 19, 1931), with quindine, the dextrorotatory isomer of quinine, without discomfort to the patient. A positive skin test was obtained to quinine but not to its dextrorotatory isomer, quinidine. A son appeared to have inherited a form of quinine intolerance, as he suffered from urticaria on the one occasion when it was given, but he gave a negative skin test to quinine. The author states that quinidine sulphate, U. S. P., given in 10 grain (0.65 Gm.) doses once a day about two to four hours before the ordinary hour of the paroxysm, has given prompt and good results in a small series of patients with malaria. The results strengthen the suggestion of Dawson and Garbade that quinidine may well be given a trial in the treatment of malaria in cases of quinine intolerance.

Marriages

EGBERT H. FELL to Miss Florence Warner, both of Chicago, June 29.

JOHN P. SPRAGUE, Evanston, Ill., to Miss Sara Gregg Holiday of Burlington, Iowa, in Hackensack, Minn., September 12.

SIEGFRIED F. STRAUSS to Miss Marian Grunsfeld, both of Chicago, September 9.

Personals

Dr. Bernard Fantus has been appointed Professor of Therapeutics at the University of Illinois College of Medicine.

Dr. William B. Peck, Freeport, addressed the Stephenson County Medical Society, August 27, on "Current Events in European Medicine."

Dr. Frederick B. Moorehead, Chicago, addressed the Sangamon County Medical Society, September 3, on "Problems of Oral and Plastic Surgery."

A symposium on acute anterior poliomyelitis was conducted before the St. Clair County Medical Society, September 3, by Drs. Jean V. Cooke and John Albert Key, St. Louis.

Dr. Edward V. M. Mastin, St. Louis,

addressed the Adams County Medical Society, Quincy, September 14, on "Present-Day Status of Gallbladder Disease."

Dr. Frederick Tice was recently appointed president of the board of directors of the Municipal Tuberculosis Sanitarium, and Dr. Allan J. Hruby, secretary.

The Chicago Society of Hotel Physicians was recently formed, with Dr. Maurice W. Samuels as president and Dr. Joseph M. Blake as secretary.

Drs. John E. Kelley and Robert S. Berghoff, Chicago, addressed the Alexander County Medical Society, September 18, on "Forgotten Points in the Technic of Operation for Inguinal Hernia" and "Syphilis of the Heart," respectively.

The Logan County Medical Society held its first regular meeting at Lincoln, September 24. Dr. Francis E. Senear, Chicago, conducted a dermatologic clinic, and Drs. Harry M. Richter and Budd Clarke Corbus, Chicago, spoke on "Gastric and Duodenal Ulcers" and "Newer Ideas in Immunology," respectively.

The Chicago Council of Medical Women will be addressed, October 2, by Dr. Marian E. Farbar on "Correlating Some Recent Studies in Pathologic Anatomy with Symptoms in Known Brucella Intakes," and Sarah Van Hoosen Jones, "Undulant Fever from the Dairyman's Point of View." The council will be addressed, November 6, by Dr. Margarete M. H. Kunde on "Endocrine Influence on the Gyclic Changes of the Female Generative Tract."

News Notes

—Mrs. Anna Louise Raymond recently gave $16,000 to the University of Chicago, the net income from which is to be used for two scholarships in the medical school to be known as the James Nelson Raymond Scholarships. The scholarships are to be awarded at the discretion of the president of the university to worthy students who are in need of financial assistance.

—The Louis A. Greensfelder Memorial Lectureship will be given, October 9, 8:30 p. m., at the Michael Reese Hospital. The program will be presented by Dr. Joseph Colt Bloodgood, Baltimore, on "The Cancer Problem"; Sir George Lenthal Cheatle, London, England, "Relation of Chronic Mastitis, Cysts and Papillomata to Cancer of the Breast," and Bowman C. Crowell, Chicago, "Cancer Clinic Problem." This lectureship will inaugurate the formal opening of the tumor clinic of the hospital.

—The highest suicide rate ever recorded in Illinois was established in 1930, when 100 more deaths than the previous high rate were noted, making a total of 1,382. The rate per hundred thousand of population was 18 against a previous high rate of 16.4. There were 1,085 suicides last year among men and 297 among women. Considering age, the greatest volume of increase took place among people in the age group 35-44, the number having been 33 per cent greater in 1930 than in 1929.

—The cancer clinic at Cook County Hospital is functioning under the following staffs: Drs. Henry Schmitz, gynecology; Karl A. Meyer and William Hendricks, surgery; Frederick Tice and Alexander A. Goldsmith, medicine; Harry B. Culver, genito-urinary diseases; George F. Suker, eye, ear, nose and throat; Chester H. Warfield, roentgenology, and Richard H. Jaffe, pathology.

—The curriculum for the school of nursing to be conducted at the Municipal Tuberculosis Sanitarium has been announced. The school, which has been divided into twenty-seven periods, will begin on or about October 15 and continue for three months. The work will begin with the history of tuberculosis, continue with study of the various stages, and conclude with instruction in home treatment.

—An experiment in air conditioning by filtration through cellulose filters is being conducted at the University of Illinois Research Hospital. The patients, who are all known to be pollen sensitive, spend their nights in a special ward supplied with filtered air under positive pressure. During the day, they are sent outdoors to be exposed to the pollen in the air. The purpose of the study is to determine the amount of relief obtained while in the ward and the effect of such relief on symptoms following exposure to air containing pollen. The hay-fever and asthma clinic of the University of Illinois College of Medicine, which is conducting the experiment under the direction of Drs.

Benjamin Z. Rappaport and Tell Nelson, accepts only destitute persons for treatment. The persons registered for the experiment are not receiving any medical treatment other than confinement to the ward.

—The White House Conference on Child Health and Protection to be held at the Palmer House, October 30-31, will have the following divisions: Medical service, headed by the Chicago Medical Society; public health service, Dr. Herman N. Bundesen, commissioner of health; education and training, Charles H. Judd, LL.D., director of the school of education, University of Chicago; child welfare, Miss Sophonisba P. Breckenridge, Samuel Deutsch professor of public welfare administration at the university, and community planning for child health and welfare, Wilfred S. Reynolds, director of the Chicago Council of Social Agencies. Many speakers of national importance will be on the program, including Dr. Ray Lyman Wilbur, secretary of the interior, Washington, D. C.

—The Charles Sumner Bacon Lectures (third series) will be given in Lecture Hall No. 221, at the University of Illinois College of Medicine, 1853 Polk Street, Chicago, by Dr. Herbert M. Evans, Professor of Anatomy, University of California, October 8 and 9. The general subject of the lectures is "The Function of the Anterior Hypophysis."

—The College of Medicine of the University of Illinois opens October 5. All departments are now housed in the magnificent new buildings located at 1853 Polk Street. These buildings are of the latest design and will accommodate 200 students in each class. The laboratories are contiguous with the Research and Educational Hospital which has a capacity of 500 beds. 360 of these beds are occupied at the present time and are used exclusively for research and teaching purposes.

In addition to the Research and Educational Hospital, the large State Department for Juvenile Research is closely affiliated with the College of Medicine and offers a wealth of material of psychological and neurological studies. A Psychiatric Institute with 62 beds and an Orthopedic Institute for children with 100 beds have also been opened. It has been necessary to limit the number of dispensary patients to 100,000 per year.

The Library and reading rooms have been enlarged to keep pace with the growth of the college. Reading rooms have a seating capacity of 500. The Library has over 40,000 volumes which includes complete files of practically all clinical and biological research journals.

—The Annual Conference of the Public Health Workers of Tennessee, Missouri and Kentucky met Friday, August 21, 1931, at the new Walnut Log Lodge on Reelfoot Lake, with a very interesting program.

The papers were all very good and the discussions were general and aroused much enthusiasm. There were a number of public health workers from Southern Illinois in attendance, so the society changed the name to "The Mississippi Valley Public Health Association," in order to include Illinois.

The following officers were elected for the ensuing year: President, Dr. J. P. Moon, Tiptonville, Tenn. Vice-Presidents: Dr. J. E. Reed, Benton, Illinois; Dr. Chas. Hunt, Clinton, Kentucky; Dr. F. L. Ogilvie, Carruthersville, Mo.

—Last spring there was organized in Chicago the Chicago Academy of Criminology. It is the object of this new scientific body to consider every phase of criminology and allied behavior problems. It will concern itself with the study of the causes and scientific diagnosis, prevention and management of delinquency, crime and mal-behavior. The principal activity of the Academy of Criminology will be the reading and discussion of scientific papers in monthly meetings, but it will attempt also to encourage the development of scientific work in criminology in other ways.

Already the best students and workers in this field in Chicago and its environs have joined the Academy. It is expected that the prestige and influence of the organization will rapidly increase in its power for good. Its main object is to put the field of criminology on the scientific and professional basis which it must have to insure more rapid progress along desirable lines.

At the first regular meeting held on May 14, 1931, the following officers were elected:

President—Edwin H. Sutherland, Prof. of Sociology, University of Chicago.

Vice-President—Ludvig Hektoen, Director,

John McCormick Institute for Infectious Diseases.

Vice-President—Paul L. Schroeder, State Criminologist of Illinois, and Director, Institute for Juvenile Research.

Vice-President—Arthur J. Todd, Prof. of Sociology, Northwestern University.

Secy. & Treas.—Meyer Solomon, Northwestern U. Med. School.

In addition to this, a Board of Directors was elected.

Deaths

Fred Thornton Barrett, Chicago; Medical Department of the University of Illinois, Chicago, 1906; aged 58; died, June 6, of coronary thrombosis.

James Henry Beatty, Mascoutah, Ill.; St. Louis University School of Medicine, 1913; aged 65; died, April 20, of tuberculosis of the lungs.

Gustave A. Berglin, Chicago; Chicago Medical School, 1921; on the staffs of the Lakeside and Jackson Park hospitals; aged 58; died suddenly, September 5, of chronic myocarditis, in his office, while talking with a patient.

Monroe Scarlet Blazer, Manito, Ill.; Missouri Medical College, St. Louis, 1874; a former Fellow A. M. A.; aged 88; died, August 22, in St. Francis hospital, Peoria.

Arthur Gustavus Bosler, Chicago; University of Illinois College of Medicine, 1900; a Fellow, A. M. A., a well known pediatrician and professor of diseases of children at University of Illinois College of Medicine; active in medical organization and formerly secretary of Englewood branch Chicago Medical Society; a writer of both prose and poetry; aged 60; died, September 18, in Englewood hospital, of cerebral hemorrhage and hypertensive cardiac disease.

Henry A. Chapin, Jacksonville, Ill.; Baltimore Medical College, 1895; past president of the Morgan County Medical Society; member of the Radiological Society of North America; on the staffs of the Passavant Hospital and the Jacksonville State Hospital; aged 59; died, August 10, in the Jewish Hospital, St. Louis, as a result of a tumor in the head of the pancreas and internal hemorrhages.

Charles E. Cook, Mendota, Ill.; Chicago Medical College, 1881; past president of the La Salle County Medical Society; aged 72; died, August 15, in the Harris Hospital, of complications following an operation for appendicitis.

George Knapp Farris, Vienna, Ill.; St. Louis University School of Medicine, 1906; a member of Illinois State Medical Society; aged 52; died recently at Harrisburg, Ill., as the result of a motor car accident.

Joseph Benjamin Goldberg, Chicago; Rush Medical College, 1902; a Fellow, A. M. A.; aged 52, died, September 25, of carcinoma of left bronchus.

Theodore Hudson, Marion, Ill.; University of Nashville, Medical Department, 1878; aged 81; died, September 2, of injuries resulting from being struck by an automobile.

Clarence Wilbur Leigh, Constantine, Mich.; a major in the World War and city physician of Chicago from 1916 to 1920; a member of Illinois State Medical Society; formerly chief of staff of Cook County Tuberculosis hospital; aged 71; died, September 10, at Constantine, Mich., of cerebral hemorrhage.

Cornelius Larsen Lenard, Chicago; University of Illinois College of Medicine, 1895; a former member of Illinois State Medical Society; aged 64; died, September 23, of coronary thrombosis and myocardial degeneration.

Joseph J. Lumpp, Chicago; Bennett Medical College, Chicago, 1901; aged 52; died, September 3, of pulmonary tuberculosis.

Milton Howard Mack, Chicago; Medical College of Ohio, Cincinnati, 1892; at one time professor of gastro-intestinal diseases, Illinois Medical College; formerly on the staffs of the Jackson Park Hospital and the Frances Willard Hospital; aged 62; died, August 30, of cerebral hemorrhage and arteriosclerosis.

William Caldwell Perrow, Chicago; Chattanooga Medical College, 1909; aged 45; committed suicide with a razor, September 14, while despondent due to ill health.

Emma Ponzer, Chicago; University of Illinois College of Medicine, Chicago, 1926; member of the Illinois State Medical Society; on the staff of the Mary Thompson Hospital; aged 48; died, May 28, of pneumonia.

Timothy Charles Quigley, Chicago; College of Physicians and Surgeons, Chicago, 1908; aged 48; died, July 31, of carcinoma of the pancreas.

John Dill Robertson, Chicago; Bennett Medical College, 1896; head of the department of surgery and president of his alma mater from 1905 to 1915, when Loyola University assumed control of the school; health commissioner of Chicago, 1915-1922; president, Chicago Board of Education, 1923; president West Park Board, 1924-1930; member of the Illinois State Medical Society and the American Public Health Association; aged 60; died, August 20, in Fontana, Wis., of angina pectoris.

William Harrah Watson, Chebanse, Ill.; Rush Medical College, 1875; veteran of the Civil War; aged 87; died, September 5, in Illinois Central Hospital, Chicago, following an operation for hypertrophy of the prostate.

Silvey Jennings Wilson, Versailles, Ill.; College of Physicians and Surgeons, Keokuk, Iowa, 1888; aged 79; died, July 21, of carcinoma.

Frank Worden, Alton, Ill.; Washington University School of Medicine, 1876; aged 77; died, August 19.

Guy J. Wormley, Sandwich, Ill.; Rush Medical College, 1893; a member of Illinois State Medical Society; died, August 30, of uremia.

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